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Original Contributions.

SYSTEMIC INFECTION, DUE TO NATURAL TEETH CONDITIONS.

BY D. D. SMITH, D.D.S., M.D., PHILADELPHIA. READ BEFORE THE PHILADELPHIA COUNTY MEDICAL SOCIETY, JAN. 28, 1903.

There are in the human mouth to-day, as has been the condition through all the centuries, malignant factors of general infection and causes of disease, wholly unperceived and neglected, and thus the oral cavity has ever been and still remains a prolific source of contagion.

Medical science and its allies, ancient and modern, virtually limiting the study of the mouth, as an index to general systemic conditions, to the tongue, and naturally looking for ultimate causes of disease to inimical foods and drinks or methods of ingestion, to so-called "malaria," to mental and physical overwork, to adverse locality, microbic atmosphere, morbid conditions of stomach, kidneys and lungs, have failed to apprehend or recognize agencies of infection, obvious, prolific and virulent, in the very vestibule of human life.

Dentistry, engrossed with its mechanics, and devoting its energies largely to the restoration of decayed teeth, has evolved nothing from the serious consequences of mouth infection, neither has it made known the most important connections of the teeth as related to general systemic conditions. Hypothetical as these enunciations may at first appear, they will be completely verified in the light of full scientific investigation.

The statement that all erupted or exposed tooth-surface in its natural state is bacterially infected surface is incontrovertible, and when it is considered that in the normal mouth from eight to twenty years of age and later there are twenty to thirty square inches of

such surface, the momentous import of these conditions becomes at once apparent.

To conceive of the oral cavity as the "vestibule of human life" is a simile not inappropriate, for it is at this entrance that all systemic stores, commissary supplies, fuels, etc., for nutrition are received and tested on their way to the stomach, the chief chemical laboratory and distributing centre of the general system. And not only this—it is here that the various foods, solids and liquids, incorporate with the oral secretions piped into the mouth from special glands, and the mass is subjected to a process of maceration in preparation for deglutition. Engaged with these and other indispensable offices, the oral cavity is never wholly out of service, and it may be said literally, that through lack of intelligent care it is generally in a state of pernicious infection. It is here that solid particles from the breath, saliva, food remains and other debris constantly deposit and accumulate, becoming cemented to the teeth chiefly through inspissation of the viscid mucus which oozes from the many glandular bodies just beneath the mucous surface in the mouth. Greatly augmenting the infection from this cavity, the air commonly diverted through it, especially in mouth-breathers and in sleep, becomes a purveyor of toxic emanations to the lungs, inevitably depositing its contagion in lung tissue and in the blood.

Necessarily the subject of such conditions, this vestibule with its twenty or thirty square inches of dentate surface becomes quickly infested and infected with all manner of bacterial formations, decomposing food particles, stagnant, inspissated, septic matter from saliva, mucus and sputum, not infrequently with pus exudations from irritated and inflamed gum margins, gaseous emanations from decaying teeth and putrescent pulp tissue, salivary calculus (tartar), nicotin, and the chemical toxins of decomposition, which result from a mixing of mouth secretions, excretions and food remains in a temperature constantly maintained at the high normal of 98° F. In this are presented but few of the sources of infection inseparably connected with the untreated teeth. Incredible as it may appear, these conditions obtain, not in the lower classes alone, but in general mouth conditions in high and low born, fastidious and boor, king and peasant.

Respecting the state of the breath in ordinary expiration, Hermann Köninger, in the "Journal of Hygiene and Infectious Diseases,"

summarizes some original experiments as follows—"The author has been able to assure himself that in an apartment where there is no appreciable current of air a person coughing or sneezing can scatter germs to a distance of more than 22 feet. Germs are scattered through the air by means of salivary droplets. These droplets are really microscopic balloons, having a bubble of air in the centre, and remain in suspension but a short time. The dissemination of droplets, with their germ-originating capabilities and tendencies, is most marked during coughing and sneezing. The more pathogenic microbes the mouth contains, the greater the danger of infection. Washing the mouth has the effect of decreasing the diphtheritic and other bacilli susceptible of being detached. Placing the hand or a handkerchief over the mouth prevents the emission of droplets charged with bacilli. During a surgical operation no one present should speak. Measures may be multiplied indefinitely for prevention in connection with this important idea of scattering infected droplets in the breath."

Thus it is manifest that with past and present conditions of mouth and teeth, infection in the oral cavity is a common heritage, and that none under existing regime can wholly escape its evil consequences. A gleam of recognition of this fact is found in the London *Lancet* of Nov. 15, 1902. The editor says: "The alarming increase of dental disease is beginning to attract the attention of the general public, while there are also signs that the medical profession is becoming more alive to the possibilities of dental disorders being important factors in the production of certain general diseases. Dental caries is the most prevalent disease of the human race. There is little doubt that a large number of children suffer from impoverished nutrition due solely to neglected conditions of the mouth."

Experience has shown that it is not only possible but entirely practicable through intelligent "prophylaxis treatment" to successfully combat caries in children, and at the same time keep the mouth in a good state of asepsis. An important auxiliary benefit from this treatment is found in its educating the child to intelligent self-care of the mouth, and in the relief it affords from the terrible dread and fear of the operations of dentistry, a present serious obstacle to proper professional care in all cases.

Recognition of this by physicians, to whose care children are naturally committed, and corresponding advice from them to parents

or guardians would result in incalculable benefit to the teeth and not less to the general health of childhood. The suggestion frequently made, that the dental profession can or should assume to control the diet of infants and children for the production of good teeth is an absurdity. If the dental or medical pediatrist had the power he would do well to give to every mother and every child a plentiful supply of healthful foods—cereals, vegetables, fruits, nuts and meats—and thus and thus only through dietetic means lay the foundation for good teeth. No special foods or methods of feeding will accomplish this end. Foods that make good bone, muscle, nerve and other tissue, will likewise make good teeth.

If by "dental disorders" the *Lancet* means dental caries, which it styles "the most prevalent disease of the human race," it may be confidently questioned whether dental caries alone should be regarded "an important factor in the production of certain general diseases." Pyorrhea alveolaris is unquestionably productive of some general diseases. My observations lead to the confident belief that the kidneys are the organs affected by the products of this particular pyemic condition. An error quite generally accepted for fact is the belief that pyorrhea alveolaris results from uremic poisoning. While uremia and pyorrhea may be and often are associated, the presence of urea in the blood is *not* a cause of pyorrhea; but the converse of this proposition is a true pathological condition. Uremia is a usual result of pyorrhea, due to the perpetual ingestion of mouth toxins—pus and other effete products—which are constantly and inevitably taken into the stomach because this inflammatory condition is in the mouth. Alveolar pyorrhea is never of systemic origin; it is wholly local and is caused by the stagnant septic accumulations on the teeth. These accumulations induce inflammation of the tissues at the gum margins about the affected teeth, and as the inflammatory products increase, the gums, pericementum and alveolar tissue become involved and withdraw more and more from sections of the teeth, forming pockets in the alveolar process beside the roots, which increase the infection and hasten loosening of the teeth. Pyorrhea is readily amenable to intelligent treatment when it is instituted before destruction of tissues has progressed to hopeless loosening of the teeth. An edentulous mouth is never the subject of pyorrhea, and whenever the disease is developed, extraction of such affected teeth always results in speedy and complete cure. In this is clearly mani-

fest the verity of the local origin of this disease. "The increasing prevalence of dental caries" cannot justly be held alone responsible as the cause of systemic disease; it is a factor, but only so far as it contributes to general mouth infection.

If my interpretation of the article referred to in the *Lancet* is correct, it would imply that "children suffer from impoverished nutrition" because of caries and inability to masticate food, and this presentation should be received with caution. The facts are, that with modern culinary methods neither perfect tooth mastication nor mouth insalivation is an indispensable part of the digestive process. It is true that free and comfortable mastication of food contributes greatly to the pleasures of taste and ingestion, and to that extent favors stomach digestion, but mastication is an office which can be delegated, as is often done, not only without injury but with decided benefit. For the maceration of foods in the mouth, water and other customary drinks may be substituted for saliva without appreciable detriment, and in many mouth-conditions with advantage to the stomach. That saliva in the initial stages of digestion converted starch into sugar might have been a matter of more consideration before sugar entered so largely into foods and drinks as at present. Now, with a constant oversupply of saccharines, saliva, frequently vitiated and infected as it is poured into the mouth, a direct secretion by the salivary glands, might in many mouth conditions give place to water in some form with advantage. Water should be regarded not simply as a food adjuvant and a diluent to the circulation, but as an integral part of nutrition; as necessary to digestion as to tissue replacement or to the maintenance of life. In this connection it seems reasonable to predict that the student of dietetics must soon broaden his field from the consideration of foods in their analytical ultimates, to embrace other and perhaps more important matters in connection with their structural compounds. The demands of tissue-building are such that we seem compelled to accept, that the real value of typical foods is dependent not so much on their ultimate chemical elements as on the value of the substance in its entirety, before the breaking up of the aqueous, vitalized compound-cells. While fully aware that this may seem in conflict with the accepted physiology of digestion, it is a theory which is found to be in accord with everyday clinical experience and with conditions yet to be considered. The indifference of the stomach to mastication and

insalivation is clearly expressed in numberless cases of edentulous mouths; in these the processes of digestion and assimilation go forward regardless of mastication, and with no apparent obstruction or derangement; and the remaining oral tissues in all cases will be found in perfect condition of health. It will yet be demonstrated that the real cause of general disease emanating from the mouth and teeth is due not so much to dental caries or disability of mastication, as to the constant and perpetual mingling of septic matter with foods and drinks, and the inhalation of toxic emanations from the persistent and abiding infection in mouths containing natural teeth.

"When does mouth infection due to the teeth begin?" It begins with the eruption of the deciduous set and continues with increasing gravity through the period of shedding the temporary and erupting the permanent ones, and thence on so long as the natural teeth are retained in the mouth; the most critical time being that of childhood and early youth, a period in which the mouth under present régime is wholly without intelligent care. Children's mouths are frequently veritable crucibles in which are generated chemical agents and compounds highly detrimental to the teeth themselves and not less to the general health of the child. Vitiated salivary and mucus secretions, bacterial placques upon the teeth, decay, retained food particles and saccharines, breaths loaded with emanations from stagnant septic matter, all at a temperature of 98° F., insinuate into the circulation a constantly increasing infection, to find expression later in life in diverse pathological conditions, and often in chronic and fatal disorders. It may appear, as it commonly does, in stomach or kidneys, in lungs or nervous system, in heart, brain or skin, in any organ or tissue to which mouth toxins are directly or indirectly conveyed.

In an endeavor to limit contagion, medical interposition very properly condemns expectorating in public conveyances, on floors, sidewalks and in all frequented places. Beards, kissing, and even the shaking of hands, are under condemnation by the scientist.

Dr. J. H. Hirsch of Chicago, in finely spun theory, says: "The most delicate perfume upon the hand is neither a sign of freedom from germs nor a protection, and the most refined are not free from diseases of the lungs or throat which are rapidly spread by touching the hand that has handled the handkerchief of one afflicted with a cold, catarrh or consumption. These diseases claim more than one-

seventh of all the deaths. Our street-cars carry signs which forbid expectorating in them, yet passengers in these same cars may hold the hand before the mouth when they cough and cover it with germs to infect a thousand people."

In *American Medicine,* Oct. 25, 1902, under "Sanitary Telephones," we read: "It is claimed that in speaking into a telephone receiver held within an inch or two of the mouth irregular sprays of saliva" (droplets) "may be ejected into the mouth-piece and the drying up and subsequent blowing about of particles so ejected might cause infection." Under the heading "Microbes in Letters" this appears: "In nine cases out of ten the envelope containing the letter is licked by the sender, as is also the stamp. Infection, therefore, may easily lurk here." If bacteriologists are correct, the beard and moustache are filled with microbes, and hence the command has gone forth in Germany that surgeons must shave. Would it not have been better if this order had compelled the wearing of mouth masks?

Volumes might be compiled from articles relating to poisoning of atmosphere in street-cars, in school-rooms, churches, public halls, theaters, bed-chambers, and homes, to which might well be added an emphatic protest against the common communion cup; but nowhere is found a sentence in regard to the malignant mouth conditions encountered everywhere, and so the oral cavity, often wholly without care, is left to infect its individual source and to pour forth a comet-like train of contagion in every expectoration, every cough and every exhalation. Although little considered, the danger attending droplet-infection due to ordinary septic mouth conditions, especially in close apartments, in the sick room, and even in common conversation, may well be shunned and evaded.

Where shall we look for the true origin of the dreaded infection lurking in sputum, in letters, telephone receivers, on lips, in beards, and in many other places of concealment? It is largely due to septic conditions of the natural teeth, and to the stagnant toxins ever present in the oral cavity. Scientific laboratory experiments in proof of this are wholly unnecessary. Every one can apply the demonstration. Passing the finger over the labial or buccal surfaces of the teeth on rising in the morning, drawing unwaxed floss silk between the teeth, or even breathing upon the hand and applying it to the nostrils, will quickly convince the most skeptical of the presence of the abounding infection in the mouth. Further evidence may be obtained by secur-

ing but the smallest particle of decomposing matter from a decayed tooth; through opening into a pulp cavity containing putrescent tissue; in gathering a minute quantity of the septic matter often mixed with pus exudation from about and between the larger teeth, as the molars, and most convincingly, through examination of a freshly extracted tooth.

Further and seemingly indisputable proof of the infection due to the natural teeth and what they gather to themselves in the mouth may be found in the almost universal improvement in general health conditions following the loss of teeth. Complete recovery from ordinary diseases of the digestive tract, from many skin troubles and numerous nervous disorders, is a usual result of the extraction of all the teeth from a given mouth. The intimate relationship of mouth infection to morbid states and general pathological conditions seems clear, and its predication worthy of special emphasis and elaboration.

An editorial in a recent number of *American Medicine* reads in part as follows: "There are ten millions of them!" "Everybody knows about them, the disease they spread, their horrors, their worse than loathsomeness! Every one endures, submits in silence, feels himself powerless to remedy. Boards of health cannot, or think they cannot, attack the evil; or they are too busy with things they think are more important. And so the filthy country and village water-closet persists from generation to generation. The intellectual philanthropist is yet to come who shall undertake one of the greatest reforms of the world."

The greatest sanitary reform of the world is not the abolition of the village closet, but it lies in the Herculean task of revolutionizing the unsanitary and infectious condition of the human mouth. Contagion and disease from the latter are a thousand-fold more subtle and dangerous than from the former, for it is found not only in country and village, *but in all human mouths and in all places where humanity dwells.*

Tuberculous patients in modern practice are sent to the woods or open air. Waxham, with whose views there seems general agreement, says, "The best results are obtained from sleeping in a tent the year round, and this can be done by shifting patients about, allowing them to spend their summers in Colorado and their winters in Arizona or New Mexico," but there remains yet to be made the first consistent effort looking to asepticizing the oral cavity, where

the most pernicious factors of this lung and stomach infection are abidingly entrenched.

In addition to the toxins engendered amidst stagnant accumulations perpetually adherent in the mouth of consumptives, the sputum itself in appreciable quantity clings to the already infected tooth surfaces, increasing bacterial placques and multiplying bacterial cultures in the mouth. Can it be otherwise than that an endless chain of ever increasing contagion thus revolves in foods and air to blood, thence to organs and tissues, to be deposited as initial infection or in augmentation of some pathological state already established; or it may return to the mouth in mucus or saliva, or in some inflammatory exudation to begin again its round of infection. In view of this, is it matter for wonder that a recent author, Dr. Jessie Shoup, writing for *American Medicine,* says that in consumption "The system is constantly placed on the defensive and at no time is it able to change front and assume the offensive." And further, "We cannot eradicate this disease." Does it not seem reasonable to infer that while present neglected conditions of the oral cavity remain the system of the unfortunate tuberculous patient will neither be able to change front nor acquire strength to assume the offensive? Dr. Arthur Latham says, "The current treatment of consumption is a mere pouring in of drugs without any attempt to reach the root of the disease." Surely heroic "prophylaxis treatment" for the teeth and vigorous sanitary measures for mouth conditions in suspected cases, and not less as auxiliary to treatment in the developed disease, are worthy of most careful and considerate investigation, in an endeavor to benefit humanity and to free the profession from the opprobrium of this "white plague."

One or two English physicians have recently made some observations respecting the effects of mouth infection on general conditions, notably Dr. William Hunter, in an article in the *Lancet,* 1900, (DENTAL DIGEST, 1900, p. 726) entitled "Oral Sepsis as a Cause of Pernicious Anemia." In his hospital practice, Dr. Hunter seems to have encountered most astonishing conditions of the mouth, due to ignorance, extreme neglect on the part of patients, and as he described them, to inexcusably wretched operations in connection with the teeth; the latter conditions unparalleled in this country it is believed even in the worst states of dentistry. In these extreme cases only Dr. Hunter has recognized and rather timidly asserted the pernicious effects of mouth infection. It is not to these appallingly

neglected and maltreated mouths encountered chiefly in hospital practice that we are to look for typical cases of general infection due to mouth conditions, but to every mouth containing teeth. The coining of the word "unsanitarized," so aptly expressive of a condition of the teeth heretofore undescribed and unrecognized, is believed to be fully justified.

What has been said of mouth infection as excitant and promotive of tuberculous conditions applies with equal emphasis to stomach, kidneys, the nervous system, and other organs. Many forms of stomach disorders have been awakened by this everpresent septic condition of mouth and teeth. Renal complications also in all forms I believe to be aggravated if not induced by the stagnant septic toxins engendered in the oral cavity and perpetually adherent to the natural teeth.

Many of the milder types of nervous disorders having yielded with surprising readiness to the "prophylaxis treatment" hereinafter to be described and advocated, confidence is established in the belief that many of the numberless cases of so-called nervous diseases —nervous prostration and kindred conditions—and possibly some, if not many, of that uncertain dread disease, toxic epilepsy, and as already intimated, probably many cases of gastric and renal disease, are engendered by the septic poisons irresistably and perpetually bound to the system through this unperceived infection in the mouth.

Susceptibility to the infection of small-pox and other zymotic diseases I assume to be heightened by the favoring culture medium in present mouth conditions. The question may yet arise whether the germ of small-pox becomes infectious until it develops culture in the mouth. If this should be accepted as an affirmation, as it possibly will be, maintenance of perfect mouth asepsis would render the system practically immune. In view of the fact that every mouth with teeth in the natural untreated state is inevitably breathing out dangerously infected droplets, how puerile seems the German contention over the surgeon's beard. If, however, discussion shall develop a better understanding of the true source of beard infection, and emphasize the special dangers attending amphitheatre and all surgical operations through droplet infection, it will in the end accomplish great good.

We are now face to face with the query, "Are these conditions

remediable or must they endure?" In 1894 the author began a line of experimental investigations to determine the true source of tooth decay. Results from these experiments, carried forward on patients only, were all in harmony with the theory that caries of the teeth begins at some point on the exposed enamel surface, and that it is primarily due to the affinity of the ultimates of the teeth for the acids of the menstruum in which the teeth are continuously enveloped. What seems indisputable proof of this theory is the fact that if a devitalized or pulpless tooth, such a tooth as is conceded to be the subject of more rapid decay than one with a vital pulp in the same environment, be removed from a mouth where resolution is rapidly taking place, and be placed in water, alcohol or glycerin, or simply exposed in the air, all caries in that tooth is at once arrested.

The inevitable deduction from such an experiment is that caries of the teeth is a result of environmental conditions, and this is in agreement with general observation and clinical experience. Growing out of the experiments referred to and their results, I have developed a system of caring for the teeth diametrically the opposite of all former conceptions, theories, and methods of practice, and whenever the system has found typical exemplification, whether in childhood, youth, middle life, or old age, most favorable and satisfactory results have universally followed.

The treatment consists of enforced, radical and frequent change of environment for the teeth, and perfect sanitation for all mouth conditions. Experience having demonstrated that the most careful and painstaking are unable with the agents commonly employed—as the tooth-brush and dentifrice, tooth-pick and dental floss, soaps, so-called germicidal washes, or other agencies—to effect this end, the plan of forcible, frequently renewed sanitation by an experienced operator has been instituted with results as stated. In detail, the process consists of most careful and complete removal of all concretions, calcic deposits, semisolids, bacterial placques, and inspissated secretions and excretions which gather on the surfaces of the teeth, between them, or at the gum margins; to be followed by thorough polishing of all tooth surfaces by hand methods (power polishers should never be used)—not alone the more exposed labial and buccal surfaces, but the lingual, palatal, and proximal surfaces as well, using for this purpose orange-wood points in suitable holders, charged with finely ground pumice-stone as a polishing material.

Treated in this manner the teeth are placed in the most favorable condition to prevent and repel septic accumulations and deposits, and not less to aid all efforts of the patient in the direction of sanitation and cleanliness.

In every instance in which this treatment has been instituted for the deciduous teeth, and in many cases of adults, there has been immunity from decay, and the teeth have shown a marked change in structural composition. Alveolar development in children also has been apparently stimulated and increased to meet more fully the requirements of erupting teeth. The extreme and unnatural sensitiveness of the gums, attended with purple color, congestion, and tendency to bleed, has in every instance been fully overcome, and there has been quick return to the normal condition of low grade sensibility, and to the natural pink tint of the gums, with typical striations and beautiful festoons. It is also apparent that the tissues of the teeth themselves, especially the dentin and enamel, probably through stimulation of the vital forces of the pulp due to this treatment, begin a surprising change for the better; a change which is first and specially noted in improved color and general appearance. Dull, opaque tooth substance, often loaded with an offensive "old-ivory" pigment, is transformed into clear, translucent tissue, the teeth assuming the appearance of living organs and having an impressive individuality.

For seven years the revelations and the benefits of this treatment, hitherto unknown, have been a constant source of surprise and delight, and with ever-increasing emphasis is demonstrated the necessity for this thorough and frequent change of environment for *all* teeth and *all* oral conditions.

To arrest or to prevent inflammatory processes in the mouth is to arrest and prevent resorption of pus exudations and other effete products of mouth inflammation, which of necessity are carried from the mouth directly into the digestic tract. The one and only method of prevention and relief from this source of infection is as stated—forcible, complete and frequent removal of the stagnant irritants and toxins which perpetually recur on and between the teeth and along the gum margins. Maintained at intervals of about a month apart this treatment is followed by immediate lessening and ultimate arrest of all inflammations and all inflammatory exudations from the oral

tissues and complete eradication of the stagnant accumulations otherwise perpetually adherent on and about the teeth.

Another important beneficial result of this treatment is seen in the unloading of the breath of its malodors and consequently of its often malignant infection, conditions frequently but erroneously attributed to the stomach. Clinical experience adds its testimony in substantiation of all this. Of the whole number of cases under this monthly "prophylaxis treatment" all have shown some phase or state of general health improvement.

The most common condition, malaise, expressed in an indifferent appetite, coated tongue and sallow skin, has in every instance in from three to four months given place to clearing of the tongue and skin, better assimilation of food, and apparent increase of vitality.

Next in point of numbers are cases of so-called "nervousness" in both men and women—several in a condition approaching "nervous prostration." The rapid improvement and recovery in these cases have been a matter of astonishment and gratification. Inflammatory conditions of the throat, some of long standing, and attended with tonsilitis, using topical applications only in addition to the "prophylaxis treatment," have in every case shown marked improvement; some have been cured and all others are improving under treatment.

One case of chronic nervous dyspepsia in an inveterate smoker, complicated with violent paroxysms of acute stomatitis; gums flabby and at times swollen, even above the occlusal surfaces of the teeth, rendering mastication extremely difficult and painful; tongue furrowed and thickly and continuously coated; breath offensive in the extreme; accepted the "prophylaxis treatment" with considerable hesitation. The result, after eighteen months' treatment, was complete restoration to normal of mouth tissues, cure of the dyspepsia, and return to full general health conditions.

There were two notable cases of alveolar pyorrhea in men, one with pus exudations from the gum margins averaging half a teaspoonful in twenty-four hours, disagreeable catarrhal inflammation of the throat, extremely offensive breath, sallow skin, and complete loss of appetite. In this case the patient stated a diagnosis of diabetes had been made and the usual restricted diet ordered. The other case was complicated with violent stomatitis involving the whole upper and lower jaw on the left side, patient in state of extreme nervous

irritability, mastication painful and difficult, food assimilation imperfect, sallow skin, coated tongue and offensive breath. Both of these cases made a complete recovery, both as to pyorrhea and general mouth conditions and the restoration of the general health.

Let me detail a most interesting case of long standing tonsilitis, complicated with chronic inflammation of the upper pharynx, the uvula and the half arches. The tonsils were greatly enlarged and all the pocketed and inflamed surfaces continuously coated with a mucopurulent discharge. There was great depression of the nervous system, irregular appetite, anxiety, frequent "grippe" colds and coughs. (The lady had been subjected to "spray" treatment for the throat and given general tonics.) This case has been only seven months under the "prophylaxis treatment," with topical applications to the affected surfaces only, and in that time has been benefited to such a degree as to warrant a most favorable prognosis. Three other cases, having all the symptoms of tuberculous decline, were noticed and treatment instituted at the stage of beginning cough and expectoration; these have improved with less than two years of "prophylaxis treatment" to such extent that it is believed there will be no further development of the disease.

It is a matter to be recognized that relief from mouth infection is to be afforded through dentistry alone. Germicides will not, they cannot, accomplish it. There must be positive and frequent removal of all septic conditions of the teeth, and all environmental states which promote toxic stagnation and germ culture in the mouth, and general maintenance of a most perfect state of asepsis for the entire oral cavity. This can be accomplished only through the most skilful manipulation of educated, intelligent dentistry.

It may seem difficult to realize, but it is nevertheless true, that no greater good could come to humanity through the medical profession than the full recognition of the dangers from this insidious, prolific, and virulent infection in the human mouth. The initiative in this reform must lie largely with the mother profession, for dentistry, with its degree stigmatized as "a badge of partial culture," and possessing but a modicum of knowledge respecting general conditions, as yet takes little cognizance of the teeth in their most important relations. Resting upon past attainments in mechanics, it fails to grasp other conditions and other states vastly more important, as witness a recent editorial in a conspicuous dental journal un-

der the title, "The Same Old Thing"—a feeble arraignment of the profession for its lack of progress; and in the same vein another journal in its editorial columns not long ago declared: "We (the dental profession) are floating in *shallow* waters. It is evident we are not doing all we should to meet changing conditions." We are indeed floating in shallow waters when the main subjects discussed by the profession are what they are to-day—"Porcelain Inlays," "Extension for Prevention," "Root Fillings," and other mechanical methods of like import. With attention thus directed to the minor matters of dentistry, appreciation of the true status of the teeth and general mouth conditions is entirely wanting.

The undisputed possessions of the dental profession include the very gateway to the human system, with all the important offices attaching thereto, yet dentistry itself has so circumscribed and limited its field of operations that it has to do chiefly with the one disease, caries, in the crowns of teeth, and he that can the more adroitly deal with this condition is generally the most lauded.

The limitations, feeble conceptions, and the errors of writers and teachers have given the general public, and the great majority of the medical profession also, the impression that dentistry is but what its schools have unwittingly made it, first and mainly the filling of a decayed tooth. Hence its want of standing as a profession with the community. In every conflict the medical opinion supersedes the dental. There is practically no finality in a dentist's diagnosis or decision.

The addition of a dental mouth mirror to the pocket-case of the physician would quickly uncover astonishing lack in diagnostic acumen respecting mouth conditions, and reveal causes of tooth decay, general mouth and breath infection, and sources of disease as unexpected as these conditions are humiliating and dangerous. The discoveries resulting from the "oral prophylaxis treatment" delineated, open a most important field of diagnostic research to medicine and surgery, and greatly enhance the opportunities for scientific development in dentistry. They also present a means for greatly extending the benefits of dental service, and for making the dental profession a branch of medicine in reality, and this in its own legitimate field, the oral cavity.

Physicians, it would seem, owe it to themselves and to the general public, in recognition of this everpresent mouth infection, to con-

sistently urge that the sphere of dental practice be enlarged to meet the constantly recurring necessities of this most momentous phase of medical and dental science.

Is it too much to hope that in the beginning of this 20th century we shall witness, from specially instituted chairs, in schools of medicine and dentistry alike, teachings which shall make plain to both professions their true relations as to kinship, homogeneity and mutual interdependence, and which shall evolve a system of Medico-Dento-Bacteriological Medicine, having for its one object and aim the betterment of human teeth, and the dethronement of Mouth Infection?

SOME PHASES OF NERVOUS DISEASE OF INTEREST TO DENTISTS.

BY C. G. CHADDOCK, M. D., ST. LOUIS. READ BEFORE THE MISSOURI STATE DENTAL ASSOCIATION, MAY 21-23, 1902.

The domain of neurology is extremely broad, for it touches or forms a part of almost all branches of medicine, of which a very important one is dentistry. I need therefore make no apology for calling your attention to certain points of more or less importance in diagnosis that have some relation to the practice of dentistry. That the dental specialist should be familiar with the general science of medicine, from a recognized desire, has become a required part of the curriculum of all our best dental schools. I therefore know that I can expect your indulgence for my neurologic point of view in what I present.

If a practical point to start from be required, I may remind you that we are all familiar with cases in which a "neuralgia" of the fifth nerve has survived extraction of all the teeth; just as surgeons are sadly familiar with cases of localized pain that has persisted in the stump left after limb amputation, and even in the second and third stumps after successive ablation of the painful parts. Cases of this kind make clear the need there is for accurate diagnosis.

The careful differentiation of organic and functional diseases is perhaps the most important office of the medical scientist in practice. The reason for this lies in the difference of prognosis for organic and functional diseases. Especially is this distinction of capital importance in diseases of the nervous system, which when functional

are for the most part curable, and when organic are very frequently incurable. This statement must be taken in a relative sense, for some so-called functional nervous maladies are incurable, and some organic diseases of the nervous system are curable. It is well, then, to gain a clear notion of what we should understand by "functional" and "organic" as applied to disease. Theoretically, organic disease of the nervous system is accompanied by demonstrable material changes in the elements of the nervous system; functional nervous disease is devoid of such material foundation. This division of nervous maladies is empirical and open to many scientific objections, but it nevertheless rests on the sound basis of practical experience, and therefore must be retained until science has reached a higher stage of development.

To pursue this line of thought would take us too far from the practical object in view, but permit me to remark that in the domain of nervous disease functional disturbances are coming more and more to be defined as mental, or dependent on psychic factors; and in my opinion such a limitation of the meaning of "functional nervous disease" is the only just and correct one. Functional nervous conditions may then be regarded as due to the mind or an idea, and capable of rapid or instantaneous alteration, removal or cure through the mind or by idea. All other nervous diseases rest on an organic foundation, *i. e.*, some pathologic alteration of tissue, whether permanent or temporary, and which for a return to a normal condition requires *time.*

This brings us to the result that functional nervous maladies and *hysteria* are identical. You ask where we are to place neurasthenia? It belongs in the frame "hysteria," I am convinced, and forms only a special clinical picture of the mental disease now known as hysteria. We shall have as an object here the points that enable us to distinguish hysteria from organic nervous troubles, especially as they interest the specialist in dentistry, and we must start with a clear understanding of what *hysteria* means. Hysteria is a term very loosely applied, and has remained until recently without any clear definition. For centuries regarded as a condition peculiar to the female sex, it is now observed with increasing frequency in the male sex. It is not, as is often thought, a state of "pure meanness," nor is hysteria a simulated condition; it is a disease having certain distinctive characteristics that have recently been thrown into clear light

by a master in clinical observation, whose teaching it has been my privilege to follow for some years—Dr. J. Babinski of Paris, a worthy disciple of Charcot. According to this celebrated observer, hysteria is a mental condition (disease) manifested in certain primary and secondary symptoms (or accidents). [The hysterical character (individuality) is not here discussed.] The primary accidents are the only ones that are properly symptoms of hysteria; the secondary accidents are the result of the persistence of the hysterical symptoms, and never arise primarily and never precipitately, as do most frequently the primary and true symptoms of hysteria. To illustrate immediately this difference: A hysterical hemiplegia may come on with the same rapidity as that due to cerebral hemorrhage, and remain indefinitely as a state of unilateral motor weakness—a primary hysterical accident; it may in the course of time be followed by more or less marked muscular atrophy in the affected limbs; and such muscular atrophy is a secondary accident, due entirely to the persistence of the primary accident.

The primary accidents of hysteria are extremely varied in form, but all are alike in that they are of mental origin—dependent upon idea. Since primary hysterical symptoms are dependent upon idea, it follows that they come and go with the causal idea. They may be cured by the removal of the idea; they may be made to reappear by reawakening the idea. It also follows that all the primary hysterical accidents can be induced in an individual open to suggestion simply by suggestion. For example, a hysterical hemiplegia in one patient may be accurately imitated in another by simple command of the experimenter, if the second subject be amenable to suggestion. Organic hemiplegia in all its signs and symptoms can not be imitated.

To sum up in a few words the definition of hysteria as conceived by Babinski, it is a mental condition presenting certain primary symptoms that may be exactly reproduced by way of mental suggestion, hypnotic or otherwise, and that may be overcome (cured) by means of persuasion (ideational influence).

The hysterical primary accidents are extremely varied—paralysis, pains, anesthesias, spasms, contractures, convulsions—but none of these symptoms or conditions ever presents the characteristic signs of organic nervous disease, such as exaggeration or loss of tendon reflexes, foot-clonus, loss or alteration of electrical excitability, etc.

From this conception it further follows that primary hysterical ac-

cidents are in accord with the experience of the affected individual; at least this is the rule as far as observation teaches. For instance, we observe hysterical hemiplegia, but it is always marked only in the extremities; it does not involve the trunk, the muscles of which have but a small place in consciousness. It is most commonly if not always confined to muscles or groups of muscles concerned in certain conscious movement, and is therefore a paralysis (ideational) of movement rather than a paralysis of muscles. There is no such thing as hysterical paralytic strabismus, though hysterical spasmodic strabismus occurs. There is no possibility of hysterical paralysis of the iris.

The primary hysterical accidents in the forms of anesthesia and hyperesthesia as a rule occupy superficial areas of the body that present themselves to consciousness as distinct parts. The rule is often given that hysterical anesthesias *always* occupy segments of members, as the hand to the wrist, the arm to the elbow, to the shoulder, etc.; that a line at right angles to the limb in its long axis forms the limit of the anomaly. It is deduced from this that hysterical anomalies of sensation never occupy the domain of distribution of any given nerve. This is too broad an assertion. A student of medicine might develop hysterical anomalies in the domain of a nerve with which he was familiar. I might cite cases of this kind—one in a student of medicine who feared the oncoming of locomotor ataxia because of subjective anomalous sensations in the domain of the ulnar nerve; another in a young girl who presented hysterical anomalies of sensation in the domain of this nerve arising from the sensations due to a blow on the ulnar nerve at the elbow.

Hysterical hemianesthesia is frequently limited quite accurately by the median line on the trunk and face and head. It would be presumptuous to try to explain this phenomenon by assuming that we think of our bodies in *exact* halves. A neurologic student might; an ignorant young woman never. Probably the common hysterical hemianesthesia is the result of suggestion imparted to the patient by the examiner in the course of his examination, for usually the patient is, up to the moment of examination, unconscious of the existence of the anomaly.

A customary but erroneous manner of making the diagnosis of hysteria is to regard a given symptom as hysterical because other unequivocal symptoms of hysteria are present. Still another grave

error is often made in regarding a given symptom as non-hysterical (organic) because the so-called distinctive marks of hysteria are absent. The fact is that hysteria manifested in a single symptom is much more frequent than hysteria presenting the classical grouping of stigmata. This is eminently true of the cases of hysteria in our country—at least as far as my experience goes. The grand attack of hysteria—convulsion, clouding of consciousness, etc.—may occur without any other symptom to indicate the existence of hysteria, as I have recently seen in the person of an athletic boy of eighteen.

The diagnosis of hysteria should always be made by exclusion of organic disease. For this we have certain signs and symptoms that point unmistakably to organic disease of the nervous system. The absence of these signs should be the base of departure in reaching a conclusion that a given nervous condition is functional (hysterical).

After this rather long introduction we may consider affections that may first come to the attention of the dentist because of the presumption of the teeth as the cause. *Neuralgia* is perhaps most important because most frequent. It seems a simple matter to know whether one has the toothache or not, and ordinarily pain in the teeth is explained by the discovery of a defective tooth, or a dead tooth with an abscess at its root—a condition sometimes overlooked by physicians. When, on the other hand, the teeth are found to be normal, or to present no cause in their physical condition for pain experienced in one or another domain of the fifth nerve, it is a grave error to proceed on an assumption and extract a tooth or teeth. With jaws and teeth normal and offering no physical cause of neuralgia of the fifth nerve, the dentist is in duty bound to seek the cause elsewhere; and if he be familiar with the possible causes of neuralgia he will often be in a position to give advice of great importance to the patient. He will often enough be able to prevent the loss of teeth when a careless physician recommends their extraction.

Neuralgia of the fifth nerve may be due to malaria—to chronic malarial poisoning presenting no other sign of the disease and requiring examination of the blood to prove the existence of the intoxication. Any other form of infection (la grippe) may likewise cause neuralgia. Neuralgia due to infection probably depends upon actual changes in the nerves involved (neuritis). Malarial neuritis

is a well-established pathological condition, which disappears gradually when the cause is removed. Many forms of common infection are doubtless still unknown to science. Localized degenerative changes in the Gasserian ganglion, as is well known, are causes of the most persistent and excruciating trigeminal neuralgia. There seems to be no definite way of diagnosing this condition, aside from the intensity and persistence of the symptom.

Since the fifth is almost exclusively a sensory nerve, we have small means clinically of detecting neuritis in it; sensitiveness to pressure at points of emergence of its branches, while giving some information, is not decisive. Perhaps closer study of the jaw-jerk will add to our means of diagnosis. This reflex area lies in the sensory and motor fibers of the fifth nerve, and the jerk is elicited by a tap on the relaxed lower jaw, given in such a way as to suddenly increase the tension of the muscles of mastication. The response is a sudden elevation of the lower jaw. It is presumable that neuritis of the fifth nerve would entail loss of this reflex before causing motor paralysis (muscles of mastication), just as has been proved in cases of actual neuritis of the sciatic nerve, which entails loss of the ankle-jerk (tendo-achilles) before paralysis develops. Furthermore, closer study of the reflex relations of the fifth nerve to the secretory glands, like the lachrymal and salivary, will doubtless ultimately give us clinical signs of value in determining actual organic disease of the fifth nerve. A true degenerative neuritis of the fifth nerve might also be due to dental caries through invasion of the nerve trunk by microorganisms. Such a possibility finds an actual parallel in rare cases of so-called ascending neuritis, in which a prick of a needle in the thumb or finger introduces some poison which is held responsible for the ascending degeneration of the nerves of the arm.

The practical points of these remarks may be summarized as follows: Pain in the fifth nerve without evident cause for it in the teeth should not be treated by extraction of teeth; not even when extraction is advised by a physician, unless he has conscientiously excluded hysteria and infections. In the absence of local and toxic causes of neuralgia others are not to be forgotten. A state of low general nutrition, due either to autointoxication or poverty of nutritive elements in the body, is capable of causing neuralgia of the fifth nerve of the most intense paroxysmal variety. In such cases

teeth should not be sacrificed until the effect of a general tonic regimen has been vainly tried. It is a fact that many neurotic (nervous) and poorly nourished persons are extremely subject to neuralgia of the superior branch of the fifth and of the intercostal nerves, a condition mainly due to bad nutrition. In such cases superalimentation is very often efficacious.

Quinin has long enjoyed a reputation more or less deserved as a remedy for "toothache" from taking cold. I would suggest as a safer remedy, which generally acts in a more efficacious way, salicylate of soda in doses of two to three grams a day, aided by such of the coal tar products as are known to give more or less immediate relief from pain. Salicylate of soda, besides its usefulness as an antirheumatic, has gained a place of importance as an antineuralgic in general, and also in many *infections*—for example, la grippe—and I am convinced that it will gain still further favor in the treatment of some other conditions—exophthalmic goitre, commencing goitre, and sclerodermia.

Let us next consider the points that enable us to differentiate functional (hysterical) facial paralysis from actual organic paralysis affecting the face. Peripheral and nuclear paralysis of the facial nerve are always accompanied by certain peculiarities that are distinctive—sensibility of the face is unaltered, but taste may be interfered with on the same side of the tongue, a phenomenon which depends upon lesion of a certain portion of the trunk containing fibers for the tongue. If the trunk of the seventh or its nucleus be involved, there is uniform distribution of the palsy throughout the distribution of the facial nerve; the upper branch suffers with the others, and the clinical picture presented is as follows: In unilateral palsy of the seventh the normal furrows and wrinkles of the brow disappear; the eyebrow on the affected side descends to a lower level than its fellow; the eyelid fails to cover completely the eyeball in the effort to close the eyes; the natural lines of the cheek about the mouth are erased; the mouth is displaced to the sound side, and the angle of the affected side is at a lower level than that of the sound side; when the mouth is opened the commissure of the lips of the normal side is seen to be more extended than that on the affected side —the opening is wider on the sound side; the effort to firmly close the mouth is easily overcome on the weak side, but not on the sound side; an effort to expose the teeth shows the unequal movement of

the two lateral halves of the mouth; in speaking, smiling or laughing the sound side of the face is seen to move decidedly, even excessively, causing a distortion of the mouth and nose toward the sound side, which is an exaggeration of the slighter distortion of the features seen when they are at rest. The tongue is not involved in its movements, but when protruded it may seem to deviate to one side, as a result of the actual distortion of the mouth. Possible error may be avoided by supporting the affected side of the mouth at the corner in such a way as to allow the tongue to be protruded without allowing it to come in contact with the lips or corners of the mouth. The facial muscles of the affected side are found to be relaxed, wanting in normal muscle tone, when they are palpated and compared with the sound side. The existence of this state of diminished tone is of great importance, for, as we shall see, it becomes a capital point in the differential diagnosis of organic paralysis from hysterical facial paralysis.

A further and most important point in the diagnosis of nuclear and peripheral palsy of the seventh lies in the reaction of the muscles to electrical stimulation; the affected muscles lose their power to react to faradism and react abnormally to galvanism, and we thus have a sure means of distinguishing nuclear and peripheral facial palsies from facial paralysis due to a cerebral lesion (lesion of the motor path above the facial nucleus).

It will be understood that a double facial palsy presents a double relaxation of the features without the one-sided distortion of them just described. In such a case the general immobility of the face, the involvement of the upper facial domains, and the electrical reactions serve to make the nature of the case clear. As I have said, in true facial paralysis sensibility is in no case involved; but such a combination is possible with simultaneous involvement of the fifth nerve. In paralysis of the face as it occurs in or as a part of hemiplegia due to a cerebral lesion, we observe some of the characteristics that have been previously described, others are wanting, and certain others are added.

When the face is paralyzed as a result of lesion of the facial motor path above the nucleus of the facial nerve, we observe but slight weakness of the upper branch of the facial, so that the brow is almost normal and the eye can be closed quite normally; the lower facial muscles are, however, in a condition quite like that seen in lesions

of the seventh (nucleus or nerve)—the same *lack of muscle tonus;* the same distortion to the sound side; the same defect of voluntary movement, etc. There is also ordinarily added a defect in the movement of the tongue—when it is protruded it deviates from the median line toward the affected side of the face; and, what is equally important, it deviates to the sound side while lying at rest in the mouth. In the tongue, as in the muscles of the face, there is loss of tonus on the weak side—a condition that can be discovered by touch, even when a patient is unable to protrude the organ.

With a view to avoiding any possibility of error in diagnosis of facial palsy, central and peripheral, and to determine the side of the face involved, it is necessary to call attention to the change that may possibly arise with the persistence of a facial palsy, central, nuclear or peripheral. In time a state of contracture (spasm) may be developed on the affected side of the face, which causes distortion of the features to the affected side, and which might lead to an erroneous conclusion as to the side of the face involved. However, in such cases close observation of the voluntary movements will always show that the side weakest in appearance is in reality most under the control of the will. In such late cases the lack of muscle tone characteristic of the early period is replaced by an increase of muscle tone. Again, the history may be invoked to confirm the actual conditions observed. In contrast with the conditions of organic facial paralysis described, we find states of hysterical paralysis and spasm, and with a view to facilitate a distinction between the organic and functional conditions the foregoing description was necessary.

So-called hysterical facial paralysis was first described by Charcot, who with his wonderful clearness of observation soon discovered that the condition in most cases, far from being one of paralysis, was a state of relative immobility, due to unilateral facial spasm. This condition of hysterical facial spasm is comparatively frequent, and it must be carefully distinguished from organic facial paralysis. In the first place, all parts of the face may be equally affected, and the features are distorted toward the side in a state of spasm, thus simulating paralysis of the unaffected side. On the side of the spasm the eyebrow stands at a lower level than that of its fellow. The seemingly paralyzed side moves more freely to volition than the side in spasm, and presents no lack of muscle tone to touch. There is no change of electrical excitability on either side. A very striking

feature is the unilateral spasm of the tongue, which causes the organ to deviate toward the side of the facial spasm, not toward the side in appearance paralyzed. This lack of conformity to the rule of supranuclear facial and lingual palsy is enough to point at once to the true nature of the case, and careful observation will show that the *apparent* weakness of one side is due to the spasm of the other side. It is to be emphasized, also, that the position of the eyebrow is of great importance.

As has just been said, in unilateral facial spasm the eyebrow on the spasmodic side stands lower than its fellow, while in cerebral palsy of the face its position is but slightly altered or not at all, though the power to raise it is noticeably diminished in many cases. In peripheral facial palsy the lowering of the eyebrow is accompanied by difficulty in closing the eye—incomplete closure, the opposite of ptosis of the upper lid. In unilateral facial spasm (hysterical) the eyebrow of the affected side stands at a lower level and the eye is partially or completely closed, so that there is an appearance of falling of the upper lid with lowering of the eyebrow—*an association of anomalies that exists in no organic syndrome of the face.*

It is not uncommon to see partial spasm of the face in the upper domain of the facial nerve—a condition that may be confounded with actual ptosis. In such cases the differential diagnosis can be made without difficulty if the relation between the eyebrow and the drooping lid is considered. In true ptosis the corresponding eyebrow is higher than its fellow. In apparent ptosis due to hysteria it stands lower than its fellow, and for two reasons: The lowering of the eyelid is a voluntary act (winking); when one eye is winked there is a lowering of the corresponding eyebrow and elevation of the opposite eyebrow, so that the difference of level of the two eyebrows is exaggerated.

In true hysterical facial paralysis we are confronted by a different state of affairs. The condition of spasm is wanting, and there is a real absence of muscular activity on one side of the face that is seen in voluntary movements, so that apparently there is a near approach to the conditions of organic facial palsy. The absence of all alterations of electrical excitability is sufficient to distinguish such a hysterical palsy from peripheral facial paralysis; and the absence of involvement of the tongue should have its weight in the diagnosis;

but more than all else, the state of normal muscle tone in the parts that are weak must be given consideration. Normal muscle tone in muscles that are weak is a certain proof that the muscles are inactive as a result of a psychic cause (idea).

It must not be inferred from the word "spasm" that it indicates clonic movements; such movements may exist, but there may be a constant "spasm" which to the observer has the appearance of weakness.

I would put you on your guard against a paralysis of the face that disappears suddenly after some operative procedure. Paralyses that disappear suddenly are hysterical.

There is but one mode of successful treatment of hysterical symptoms: ideational influence. The ways of effecting cures by this means are infinite, but before we can hope to succeed we must be sure to know that we are applying the means of a suitable case. To attempt to describe the means of mental treatment would tax your patience too far. I will say in conclusion only that with a correct diagnosis the method of cure will often suggest itself to the accurate observer of individuals.

RECREATION AND EXERCISE FOR PROFESSIONAL PEOPLE.

BY C. D. PECK, D.D.S., SANDUSKY, O. READ BEFORE THE NORTHERN OHIO DENTAL SOCIETY, JUNE, 1902.

Democritus said: "The force of the understanding increases with the health of the body. When the body labors under disease the mind is incapacitated for thinking." Gladstone said: "All time and money spent in training the body pay a larger interest than any other investment;" and to quote a modern teacher, President Eliot of Harvard: "To attain success and length of service in any of the professions a vigorous body is essential. All professional biography teaches that to win distinction in sedentary, indoor occupations, which task the brain and nervous system, extraordinary toughness of body must accompany extraordinary mental powers."

It is the natural tendency of nature, and especially of all animal creation, to protect itself, and it is worth the asking if life can be prolonged by physical exercise. To do this, let us consider that the body is composed of a series of cells that are similar to the lowest

forms of protoplasmic life; that these cells undergo constant changes, go through a species of death, and are cast off to be replaced by newly-formed ones that may be said to exist in a state of activity after their formation, and are then followed by their death. This process is necessary to the maintenance in man, of: First, animal heat; second, nervous force, and third, muscular energy. For this process of transformation, man must consume due amounts of food; this is required for all three purposes. Probably we have observed people who did certain tasks of physical or mental labor without partaking of sufficient food, possibly working a whole morning with but a cup of coffee for breakfast. If this be done without eating sufficiently at other times during the day the individual will be doing his work at the expense of the second or nerve force—as we might say, "just working on his nerve."

But people who have good appetites, and who consume sufficient quantities of food, the presumption being that the digestive apparatus is in normal working order, must have physical exercise in order to stimulate the natural bodily functions, and thereby cause the birth, growth and replacement of new cells that are constantly being produced by the secretory organs. If all tissues, organs and muscles of the human system get their proper share of the nourishment, it devolves on the individual to see that this be done, and it can be done only by using the muscles of the system, giving them vigorous action, that this nourishment be properly distributed throughout the entire system, every portion getting its share of the nutrition. Or it must be understood that it is liquid food in the blood that is referred to, and it is by its action that the blood, the vital fluid, is renovated and the tissues reinvigorated.

Exercise that does not call into action all of the organs and muscles will be one-sided or too excessive; that is, for some sets of muscles, which is true with nearly all sedentary people, and is certainly the case with those who follow our vocation. The life followed by attorneys, teachers, students, etc., nourishes and develops the brain, but at the expense of the other organs, which often results in constipation, digestive irregularities, sluggishness of the liver and biliousness. Has any of us ever heard of a dentist being bilious? Has any of us ever heard of a dentist who was not bilious? Well, perhaps there are some such dentists, but if so they certainly are subject to congratulation.

The increasing tendency to the division of labor and specialization in the professions causes a great tendency to this lopsided development, and necessitates people who follow such professions taking special means to keep the physical system in health and normal condition. The division of labor also has a tendency to shorten the hours of employment, and this gives more time that may be and should be utilized for recreation.

In some localities efforts have been made to give the people systematic exercise, with the result that these people are happier and longer-lived. For instance, the average of human life in England is now thirty-four years, whereas a century ago it was twenty-eight years. The gymnasiums that have been established in Young Men's Christian Associations, churches, etc., have been of vast benefit to the working masses, and those who belong to the so-called well-to-do classes have received great physical improvement from horseback riding, tennis, bicycling, golf and other sports, not to omit ping-pong.

It should be the purpose of those who follow sedentary occupations to use such exercise as will best atone for the deficiencies of one's life occupation. If certain muscles receive habitually almost no exercise, the lungs and heart are lacking activity. Some intelligence should be used in selecting exercises that will set these organs to work. There are many systems nowadays that are presumed to be excellent for giving the required activity which professional and sedentary people require, and each and all of them in their lines are good, and if used with intelligence and persistency will be of great benefit.

If the business or professional man who lives one or more miles from his office will walk to and from his home it will doubtless have a similar effect to that sustained by a washerwoman, who said that after she had been working hard all day it rested her to spend an hour riding her bicycle. Who of us after a day of tedious operating at the chair, and feeling so fatigued that he simply wanted to sit down and remain there, has not felt a sense of relief, even of restfulness, if he took a vigorous walk in the open air for half an hour?

With a quotation from Shakespeare I will close:

"Though I look old, yet am I strong and lusty,
For in youth I never did apply
Hot and rebellious liquors in my blood;

Nor did not with unbashful forehead woo
The means of weakness and debility.
Therefore my age is as a lusty winter—
Frosty, but kindly."

POSSIBILITIES OF PORCELAIN AS A FILLING MATERIAL.

BY W. T. REEVES, D.D.S., CHICAGO. READ BEFORE THE MICHIGAN STATE DENTAL ASSOCIATION, JUNE, 1902.

In presenting this subject for your consideration I shall endeavor to show some of the possibilities of porcelain as a filling material, when and where it can be used, and how it should be manipulated; also some theories of mine as to why it is the most permanent of all the materials we use to-day for the restoring of lost tooth structure.

When and where it can be used. Porcelain as a filling material has been used for many years, but it is within the past five years that it has been advanced to the position which it holds to-day. To you who are working along these lines I hope to bring some new principles that will stimulate you to a more extensive use of porcelain as a filling material. To such as are looking on from afar, waiting for the experimental stage to pass, I want to say that the time is now here. Porcelain inlays are no longer an experiment, they are a proven success and have become a permanent feature in all dental operations.

When the ability and skill of the operator are sufficient to successfully complete any given case, and the patient is able to pay for the time and skill expended, porcelain is the ideal filling material. I say ability advisedly, for there is nothing we do that requires such careful attention to every detail as the making of a porcelain inlay; the slighting or hurrying over of any portion of the operation will result in failure. The old saying, "Practice makes perfect," applies with great force to this branch of our work. Any one of you would laugh at the student in your office, who might by observation have acquired a certain amount of knowledge, who should attempt to fill for a patient any of those cavities that looked so easy as he saw you do the work. You all know the amount of hard work you did

before you acquired the skill in handling gold that makes the filling of difficult cavities to-day easier than the simple ones were when you began. This applies with double force to the making of porcelain inlays.

The person who in paper or discusssion (and there have been a good many who have gone on record in the past few years) says that "porcelain inlays are limited to the simpler cavities, easy of access, in the anterior teeth," occupies the same position as your student would if he should say that gold could be put only in simple cavities easy of access, because his inexperience limited the use of gold in his hands to such cavities. As you acquire experience you will go from easy to more difficult operations until you become so proficient that filling of the most extensive cavities in molars or bicuspids will be possible in your hands. Then you will restore with inlays teeth that it would have been impossible to fill with gold, and will do it with the minimum amount of mental and physical strain upon both yourself and patient. There is no work you do that is so easy from start to finish for the patient as the preparation of a cavity for the insertion of a porcelain inlay.

Where porcelain can be put. You will conclude from the foregoing that I place hardly any limitation as to where you can use porcelain as a filling material. It can be used in more places and with a greater degree of success than gold. I will briefly enumerate some of the persons for whom and places where porcelain can be successfully used. With those high-strung nervous temperaments for whom it is almost an impossibility to prepare a cavity even for a cement filling, to say nothing of gold, you can prepare the cavity for an inlay with comparative comfort, and when set you have done permanent work. For the young, in whose mouths gold fillings fail faster than cements wash out, you will come very near doing permanent work with porcelain inlays. For those refined, sensitive natures, to whom the extensive display of gold in the front of the mouth is an everconscious annoyance, you can confer a great benefit, and restore to full contour and usefulness the worst broken down teeth, so that persons at close conversational range will not observe that artificial means have been resorted to. For the aged, whose strength will not permit of the protracted operation of inserting a gold filling, an inlay can be made, for if necessary the work can be divided into two or three sittings of comparatively short duration.

For those bordering on nervous prostration you can do permanent work with the minimum amount of nervous taxation. For women during gestation, and for the young mother whose maternal duties make it impossible to take the time necessary for a large gold filling, where it has been necessary to temporize heretofore, you can now do permanent work.

Suitable cavities for porcelain. To enumerate the different cavities in which porcelain can be used would practically be to name all that occur, from the central incisors back to and including the upper and lower third molars. I will cite only a few cases and conditions in which porcelain will give a great deal better service than gold. In those extensive cavities where decay has encroached so far that death of the pulp would almost surely follow if filled with a metallic agent, although you might have lined the cavity with the best non-conductor, porcelain will give almost absolute security, the pulp will remain alive and the tooth will be comfortable. Clinical experience has taught us that porcelain is the best non-conductor of thermal changes, and practically restores the tooth to nearly as normal a condition as though decay had never occurred. Cavities on the buccal surfaces of molars and bicuspids at the gum margins, which are sensitive to anything hot or cold taken into the mouth, and cavities on the labial surfaces of the anterior teeth that are sensitive when filled with gold to the drawing in of a cold breath, lose sensitiveness when the gold is replaced with a porcelain inlay. Accidents to the young that result in the breaking off of a tooth, even to the extent of half the length of the crown, where it is desirable to retain the pulp alive on account of the incomplete development of the root, can be restored to full contour and usefulness with a porcelain tip, and the pulp will remain alive. Cavities from which the best inserted gold fillings are being constantly bitten out by force of mastication can be filled with inlays that will stand all the stress to which teeth should be subjected.

How porcelain should be manipulated, and why. I expect to show you cavity formation and my method of burnishing a matrix at the clinic, so will not take your time to describe them here. High-fusing bodies are the best in every feature of inlay work. Low-fusing bodies, i. e., bodies that fuse below the melting point of gold, do not produce the translucent natural-looking inlays that you can make with high-fusing bodies. For illustration, I will describe the

handling of the different bodies in making an inlay for an approximal cavity in a central incisor extending from the cervical margin to and including a third or half of the cutting edge. Select some one of the several good bodies that are on the market to build what I call the foundation of the inlay (I use Close's body or Brewster's Foundation), and have it ground fine, as it will pack more solidly, carve better, and shrink less than if left coarser. Build it into the matrix little by little, jarring it down well to make it solid; build out the corner in excess of what you expect the contour to be, to allow for shrinkage; when sufficiently dry that you can carve it, begin to carve and shape it, so that you will complete this work before it is dry enough to crumble. Carve the lingual surface right down to the contour the matrix gives you, then carve away what would be the labial half of the inlay, carve it away right up to the matrix, so that the room for laying on your colors will be the same at the edge of the tooth as any other part of the inlay. Then bake, and if you have estimated your shrinkage correctly you have an inlay for the lingual half of the cavity only. If shrinkage has been greater than expected, build on more of the foundation and bake again, and you are now ready to build on the colors you wish the inlay to be. You can vary the shading from the neck of the tooth to its cutting edge at pleasure. I never mix two or more bodies together to vary the shade of one, but depend upon the thickness of the layer to give me the shade desired. You can secure any shade of a given color by the thickness of the layer of enamel used. I can best illustrate this by showing the effect of holding a sheet of colored glass to the light—you get a certain shade of that color now; place another sheet back of it and you get a deeper shade of the same color, and by adding more sheets of glass you get a still deeper shade of the same color. It is the same in using bodies—you can get any shade of a color by the thickness of the layer used. Build the colors on in layers and bake each layer as you go along. When you have built the colors to almost full contour, cover the whole inlay with a neutral color that will allow the underlying colors to reflect through. In this way you will secure a translucent effect, and it is the only way that the translucency so desirable can be obtained. In the tooth you are trying to match the colors are all in the dentin and reflect through the enamel. The enamel of all teeth is practically the same color, the different shades come from the difference in the dentin.

All inlays, whether for restoring contours, or for simple saucer-shaped cavities, I build up in layers, and never less than three—foundation, color and enamel. An inlay built up in layers accomplishes three objects: first, a natural translucent-looking inlay; second, if built of three or more layers of different bodies it will break up the absorption of light, so that from whatever angle or point of view it is examined it will look practically the same. An inlay built all of one body or mixture will absorb light only from one direction, and viewed from one point will look right, but from the opposite side will show as differently as black and white. An inlay built in layers will come very near to imitating nature's method of building up a tooth, and by breaking up the direct absorption and refraction of light rays will come very nearly looking the same from all points of view; third, you overcome that great bugbear of most inlay workers—the cement showing through after the inlay is set. An inlay built up in layers will prevent the reflection of the cement through from underneath. You will often hear operators say they had a splendid color before the inlay was set, but that the cement killed it entirely. This is because the inlay was baked of one body only, and the cement could reflect through from underneath as easily as the light was absorbed only in one direction from above. The three points I therefore claim for this method are, translucency, avoidance of shadow, and prevention of cement reflection from underneath.

This brings us to the method of selecting the colors for an inlay. I want to advocate a new principle in color selecting. I will quote in part from a paper I read before the Iowa State meeting last month: "It is the general practice to select the color as one selects a facing for a crown, by taking the shade guide furnished with every outfit of bodies and selecting the color that seems to be a match for the tooth. In selecting a facing general effect is aimed at, and the selection is one that harmonizes with the adjoining teeth. A person might select a facing that when placed between two natural teeth could not be detected, but if a corner of that facing were joined to the corner of either adjoining tooth it would not match at all, because each tooth has different underlying colors. It is underlying colors for which you must look. When you look at a tooth in this way it will surprise you to note what a different lot of colors are

seen, and it is just in proportion as you are able to see these underlying colors, and are then able to reproduce them in your inlay, that you will be successful. When you look in this way at what you would say was a typical light yellow tooth it will surprise you to see that there is either a gray or blue tinge, or both, inside that tooth. Those same colors must be in your inlay or it will not be a perfect match. I use the shade guide not to secure a match for the tooth, but to help me in looking for the underlying colors and the degree of those colors."

If you see yellow, brown, blue, gray, or all of them, hold the shade guide to the tooth and determine the strength of these colors, also the order in which you will use them to give the effect desired. Make a memorandum of this. For instance, you are making an inlay for a typical light yellow tooth; the cavity extends from neck to cutting edge, involving at the cutting edge a third (more or less) of the width of the tooth. Yellow No. 2 on the Brewster shade guide looks to be a perfect match for the tooth, but at the neck you find the yellow a little deeper, with a grayish tinge through the center third of the tooth and a bluish tinge toward the cutting edge. Now you will find on looking closer that the blue seems to reflect through a gray, and that there is very little yellow in this part of the tooth. My memorandum would read thus: Patient A; foundation, cervical, No. 3 yellow; center, No. 6 gray; cutting edge, No. 9 blue under No. 5 gray; over all No. 2 yellow with No. 11 for enamel. I would proceed to use them as follows: build the foundation as described; the yellow, gray and blue would then be put in their respective places and baked as one layer; have the three bodies properly moistened and arranged on the slab so that you know which is which; take as nearly as you can judge the proper amount of each and place at its respective place; then a slight draw of a knurled-handled spatula will bring the moisture to the surface and cause them to run together; cease instantly and you will have a perfect blending from one color to the other. If you continued to jar you would have a mixture instead of blending; allow it to dry, and bake. You will find that shrinkage will necessitate the building on of more of these colors, and this time, as you want gray over the blue, you will use only No. 3 yellow and No. 5 gray; have the bodies ready and proceed as before. This will still further harmon-

ize the colors, because the yellow will extend still further down the inly and modify the gray that was put on in the central portion, while the blue of the lower third modifies the gray, so that when they are all covered with the lighter yellow you have such a harmonizing of colors that you can't tell it from nature's work itself.

If shrinkage causes any lack of contour, and it usually does, and is really to be desired, cover all with a layer of Brewster's X X body, which is a new product that Mr. Brewster has been working at for some time. He brought me the first to test about two weeks ago, and so far it seems to fill its mission perfectly. It is no particular color unless you call it enamel color. You now have a completed inlay that I believe comes the nearest to reproducing nature of any methods heretofore attempted.

A still further artistic effect can be obtained by the use of what I call primary colors. They are as deep as black, Prussian blue, Van Dyck brown, burnt ocher, etc. They are high-fusing bodies and not paints, but they must be used as paints would be, by putting them on mixed with oil, for you can not put them on thin enough or smooth enough mixed with water as you do ordinary bodies. These are a set of colors that were made for me by Mr. Brewster, and they are meeting a long felt want. Their use is not confined to inlays, but they can be used to artistically change facings and teeth for all kinds of artificial dentures. They are now put on the market in a very convenient form. They are distinct and separate from his regular set of bodies. With them you can reproduce that steel blue line so often seen just above the cutting edge, also the tobacco-stained teeth, and the white and yellow mottled teeth. These effects have heretofore been impossible, but with the primary colors they can be reproduced with lifelike naturalness.

Why is porcelain the most permanent of all the materials we use to-day? There are several clinical facts in connection with inlays that are at present unaccounted for. First, there is practically never a recurrence of decay around porcelain inlays; second, they stay in all cavities under all conditions better than gold fillings; third, when in contact with an adjoining tooth they are a protection and safeguard against decay of said tooth.

To the first I will not try to give an answer, only to say it is an established fact, through the observation of all inlay workers, that

there is seldom or never any recurrence of decay around an inlay. This fact of itself is enough to place porcelain among the first as to permanency. Second. Here is where we have so many doubting Thomases. It seems almost impossible for a dentist to conceive of any other law of physics than the one he has been brought up on —that of a retentive form of cavity and an interlocking form of filling material. It seems equally hard for the majority of inlay workers to break away from that same law.

In the April issue of one of our leading dental journals was printed a paper that had been read before two dental societies, in which the author gave his conception of a cavity formation that would be interlocking against lateral stress. There are others that are working along these same lines. This is a useless waste of time on the part of the operator and a needless infliction of pain upon the patient. Still others are baking into inlays platinum pins and loops for the purpose of rentention. It has been a number of years since I abandoned this practice. This came about through having a tooth so sensitive that it was impossible to cut the pit for the pin to set in. It was a case in which an inlay was indicated, and I made one without a pin in the cutting edge, trusting to luck that it would stay. It stayed just as well as any that had pins baked in, which set me to thinking, and the result was that I abandoned all such means of retention. It took me longer to get away from the idea that I must undercut the cavity before setting the inlay, and undercut the inlay as far as possible. It is about three years since I abandoned this practice, and I believe that clinical experience has taught me the true principle of inlay retention. It is close adaptation to all parts of the cavity, and setting the cement under pressure.

"It is exactly on the same principle as a joiner joins two pieces of wood. He prepares the surfaces to be joined so that they are in perfect adaptation to each other, and placing glue on these surfaces, puts them in a vise or clamps them together under as much pressure as he can until practically all the glue is squeezed out. Then he leaves it to harden, and the less glue there is the stronger the joint. This I believe is the true principle upon which inlays depend for their strength of retention. It was formerly my practice to score the reverse side of the inlay with a knife-edge carborundum wheel, removing as much of the glaze as possible, but often inlays were of

such size and shape as to make this extremely difficult. It has been my practice for some time to etch the reverse side of all inlays with hydrofluoric acid. This removes all the glaze, leaving a roughened surface, but does not alter the close adaptation the inlay must have for the interior of the cavity as well as at the margins."

Third, when in contact with an adjoining tooth they are a protection and safeguard against decay of said tooth. I have always contended that an inlay should never be ground on any other than the occlusal surface after it is set. If any grinding is necessary it should be done before the matrix is removed, and the inlay then be glazed again in the furnace. The approximal surface of a gold filling or crown, no matter how highly polished, will retain fine particles of food that are an exciting cause of decay. The natural enamel is easily attacked by the acids of fermentation, and soon becomes roughened and holds increasing amounts of food, and decay follows. Glazed porcelain will not retain food deposits and is not affected by the acids of the mouth. Therefore the approximal space or contact point that one surface is restored with a porcelain inlay lessens by more than half the liability of decay of the adjoining surface, while if the restoration had been by gold filling the liability would have been increased over the original conditions, for gold soon becomes tarnished and retains collections in excess of enamel. These, I believe, are sufficient reasons to establish the claim that porcelain is the most permanent of any filling material we have to restore lost tooth structure.

RELATION OF THE DENTIST TO PHYSICIAN AND SPECIALIST AND VICE VERSA.

BY E. H. SHANNON, D.D.S., CLEVELAND. READ BEFORE THE NORTHERN OHIO DENTAL SOCIETY, JUNE, 1902.

The subject naturally divides itself into two distinct parts, namely: The relation of the dentist to the physician and vice versa, and the relation of the dentist to the specialist and vice versa. The relation of the dentist to the physician is purely an ethical one, as the opportunities of the dentist for referring cases to the physicians are fewer than those wherein the physician can refer cases to the dentist. I might state here that I do not care to go into detail in this paper, but will consider the subject in a general manner.

As dentistry is a specialty of medicine, it behooves us to know something of medicine in general, as a specialist in orthodontia, or any other specialist in dentistry, would be expected to know something, at least, of the general practice of dentistry. The intelligent dentist should have some idea of the different diseases that affect suffering humanity in order to converse intelligently with his patients in reference to any ailment, or discover any disease that may be causing trouble and annoyance. It is not necessary that he should know all in reference to the case, its diagnosis and prognosis, but he should have at least enough knowledge to advise his patient to seek the services of a physician. Many a person will continue suffering from some trouble, caused primarily by a slight indisposition, which if neglected may result in a disagreeable and offensive chronic malady, which in all probability could have been checked in its earlier stages. Suppose a condition of this kind should come before the notice of a dentist. A little advice diplomatically given in most cases would have more influence with that person in persuading him or her to seek medical assistance than the combined influences of the immediate members of his or her family. Therefore, does it not behoove the dentist to take an active interest in the welfare of his patients? I think so. The aim of medicine is identical with that of dentistry, namely, the relief of suffering humanity in the quickest and surest manner. Both professions have almost a divine purpose, and their members are regarded by some people as ministering angels on account of the blessings they bring to mankind, and it is our duty to maintain this high dignity of our profession. But it sometimes seems to me that our profession maintains this exalted position, not because we have so many angels enrolled among us, but in spite of the fact that we have so few.

Relation of the Physician to the Dentist. We will now turn our attention to the relation of the physician to the dentist. There seems to be more ways wherein the physician can aid the dentist than vice versa, and thereby give greater happiness and comfort to his patients. How often do we see cases that are nauseating to the stomach and revolting to the eyes? How often do we have patients come to us, from say the age of twelve and upwards, with the mouth in a very unhygienic condition? Why do we see such cases? Is it because the patients have no sense of hygiene or

healthy surroundings? Partly, but most frequently it is due to neglect and carelessness. How can we remedy this sad condition, or even partly alter its dire effects, if it is to be allowed to continue unmolested? Can the physician be of any service to us? I think so. How? The family physician, if he is conscientious and has the welfare of his patients at heart, while treating the different members of the family from time to time cannot help but notice whether the mouth and its organs are in a sanitary condition, and if he should find them in an unsanitary condition his plain duty is to give his best counsel, and that would be to consult their dentist and have their mouths and teeth put in a hygienic condition. Dr. W. B. Keyes, in his paper on "Pyorrhea Alveolaris with Special Reference to Practical Medicine" (DENTAL DIGEST, March, 1902, p. 226), cites several cases where this virulent disease, pyorrhea, caused different derangements of the stomach, and where the physician, depending upon his treatment alone, was unable to get satisfactory results, but in conjunction with the dentist most happy results were attained. Now if these results have been obtained, and they are being attained, by the coworking of the dentist and physician, why do we not cultivate a closer relation with one another? Why do we not encourage the interchange of thoughts and ideas? We are working for the one end, and why not make our road clearer and brighter by the assistance we can give one another?

Relation of the Dentist to the Specialist. I shall speak only generally, so will not name the several different specialties of dentistry. What I have to say will be true of all as I see them. The relations between the specialist and me have been most happy, and I can truthfully say that my patients have appreciated my effort in securing for them the best results. It seems to me that most of us, to use a slang phrase, "have been up against it," that is, each one of us has had at least one or more cases which have tested our skill to the utmost. We may have a case wherein we are sorely tried, as it may be in a field in which we have had but little experience. We do all we can, but at the completion of the work we find it does not answer our conception of what it should be. In other words, it is a complete failure, and we hesitate as to whether we ought to insert such a piece of work or not. In our minds we know that it could have been done properly by a specialist in that particular line, and

our consciences, if we have any left, will always accuse us of wrong-doing for not giving our patients our best advice and sending them to a specialist in the first place. In order to survive we must have patients, and the only way we can retain them is by being honest and straightforward, and by doing our work well. I do not believe in bluff—I heartily despise it, and when I find myself incapable of performing a certain kind of work I am not ashamed to acknowledge my incompetency. I have not the audacity to assert that I can perform any and every kind of dental operation that may chance my way, and the sooner we appreciate the fact that there is a limit to human capabilities the sooner will we have less failures scored to our account. I do not wish to put up any barriers against healthy progression, but I do wish to encourage using our brains. Cease bluffing. Be willing to acknowledge our mistakes and always give the patient the benefit of the doubt. I consider it criminal practice the way some of our patients have been treated. Some operations have been performed seemingly with the sole purpose of draining the purses of the patients.

The Ethical Relation Between the Specialist of Dentistry and the General Dental Practitioner. The dental specialist is now a well-established factor, and holds as distinct and important a place in dentistry as dentistry does in medicine. This being the case, what relation should there be between a specialist of dentistry and the general dental practitioner? In dental ethics we have a literal code, which if lived up to would find us an ideal unit of professional dignity and honesty, but you may write and preach ethics from now until the judgment day; you may have every dentist in the universe sign this code of ethics, and yet we still will have hypocrisy and deceit—men who will deviate from the true standard of ethics because of the frailty of human nature. If I were to formulate a code I would have but one common law—"Do unto others as you would have others do unto you." I would trust my fellows. I would encourage them to be independent and do away with rule. A rule has always seemed to me an incentive for revolt or to kick over the traces, and many of our most prominent dentists have been playing with the code of ethics for years and seeing how near they could infringe on its literal sense without really attacking it. The moral sense of the code they have time and again shattered, and so it is a law binding only

in its literal sense. If one has no moral stamina a law is utterly useless. We have no written ethical law between the specialist and the general practitioner, and I thank God we haven't. If I send a patient to the specialist I expect him to send that patient back to me when he has completed his particular work. Simply "Do unto others as you would have others do unto you," and you cannot go astray.

A closer brotherly and professional feeling between the physician and dentist has been my desire since embarking upon my chosen calling. There is nothing to be gained by antagonism between the two, and there is everything to be gained by a welding of forces, sympathy and good fellowship. So let us be congenial; a blessing to each other and a boon to humanity. Let us bury our professional jealousies and prejudices and become as one; a perfect unit; the completion of an ideal machine for the advancement of dental science and the realization of greater and more lasting blessings for our patients.

ORTHODONTIA.

BY H. S. VAUGHAN, D.D.S., KANSAS CITY. READ BEFORE THE MISSOURI STATE DENTAL ASSOCIATION, MAY 21-23, 1902.

Perhaps we had better first define what regularity or irregularity is. A regularity, as I understand it, is a condition where the teeth are arranged in the jaw representing a semi-ellipse, slightly flattened at the curve, with the teeth touching each other at the smallest possible point. An irregularity is a condition where the teeth do not form this curve, but are either outside or inside of it, and thereby cause a larger surface to come in contact with the adjoining one. The teeth are smaller at the rear and near the crown of the teeth, which brings their point of contact on the curve, which is quite small, making them less liable to decay. Should the central incisors lap, these make the largest possible surfaces come in contact, thereby causing decay, and even return of decay after filling. The teeth may be long or short, and so cause an irregularity.

The next point for consideration is the causes of irregularity. They are many and at best but briefly understood. Many operate before birth and many after. For convenience we will therefore

class them under two general heads for consideration—hereditary and acquired. *Hereditary.* Hereditary irregularities are the hardest to deal with, owing to their stubborn tendency to return to their former condition. It therefore requires a much longer wearing of the retaining appliance. The well-known biological law of transmission of characteristics is nowhere better defined than in the dental organs. The child may inherit the teeth of the father and mother, one or both, or skip them and have teeth like a grandparent, or it may have the misplacement of a single tooth, like the parent. Not only may one child of the family inherit irregularity, but every child may partake of the same deformity. In such cases the physical impress, confirmed by repeated transmission, must be overcome, which is no easy matter. Intermarriage of races of widely different characteristics is one of the most common causes of irregularity. We have the large jaw of the one with the small teeth of the other, giving that condition of wide interstitial space which is next to impossible to overcome; and the large teeth with small jaw, which is not so difficult to obviate if some teeth be removed. People of widely different size, vigor and feature will always have some deformity in their children's teeth.

Acquired Causes. Irregularities produced during dentition and subsequent to it far exceed those from heredity. I will simply name some of the main causes and discuss them briefly. They are: The long retention of deciduous teeth; early extraction of deciduous teeth; injudicious extraction of permanent teeth; delayed eruption of permanent teeth; supernumerary teeth; accidents; adenoid vegetations, and habits. You well know the evils resulting from too long retention of the deciduous teeth or early extraction of same—lack of space for the erupting teeth, contracted arch, for the jaw will not attain its full growth unless there is pressure to expand it. Every one has seen cases where the temporary cuspid has been removed even before the bicuspids have erupted, which means we are almost obliged to have what are commonly known as tusks. Too long retention of this or any other tooth may have the same effect; therefore I emphasize the point that we should make a complete study of each one of these cases—for no two are exactly alike—and keep the child under perfect care at this all-important time. By the injudicious extraction of permanent teeth you may

cause one of those conditions not easily corrected; you may change the median line of the teeth, and possibly ruin the the articulation.

Some authorities claim it is best that if one tooth is removed the corresponding one on the other side should also be removed. Others say all four corresponding teeth should come out. This, I think, is folly, for the articulation can not be so interfered with as they claim. I do think a removal of corresponding teeth of the same jaw is wise. Supernumerary teeth should be removed as soon as discovered to so be, otherwise they will cause a deflection of the permanent teeth. They look like pegs, and the most common place for them is between the superior central incisors.

Accidents are so numerous that I will hardly have time to discuss them freely, except to say that a child falling and striking the front teeth so as to drive them up in the jaw may cause the permanent teeth to be forced a little out of line, either out or in, should they be at that formative period. Adenoid vegetations cause that dome-like arch often seen, on account of the destruction of the vomer, which is the support of the palate.

The habit of thumb, lip and tongue-sucking is one easily diagnosed. Even the hand used in thumb-sucking can be told. The central, lateral and cuspid on that side slope out on the upper and in on the lower. If the thumb is held perfectly straight the teeth on that side will be shortened. In lip-sucking all the lower front teeth slope in and the upper uniformly out.

There are some mixed etiological conditions which come under neither of the two foregoing heads. They are, protrusion of the upper teeth, inferior protrusion, lancet arch and constricted arch. Superior protrusion is supposed to result from delayed eruption of the posterior teeth, thereby causing the lower front teeth to so strike the upper as to force them outward. This may or may not be so. The cases I have seen were hereditary, all the children of two large families inheriting it. I am not able to say what the original cause was. Inferior protrusion I have no doubt is due to delayed development, for no other reason seems half so probable. The lancet arch is a condition about which there is a difference of opinion. Some claim it is hereditary; others say that it is due to tongue-sucking, or to some condition of the vomer, or to slow formation of the premaxillary bone, and too early extraction of temporary

teeth. This theory is not well based, owing to the regularity of the teeth with this condition. The constricted arch is indicated by the bicuspids being crowded inward, most often due to a lack of space in the jaw. I claim this to be so on account of lack of space from too small a jaw for the teeth, as before mentioned. This condition is best corrected by the removal of one or more teeth. The law governing the extraction of permanent teeth should be very clear. Generally speaking, remove the tooth nearest the seat of trouble, provided it is not one of the six anterior teeth; or remove a badly diseased tooth, provided it is not too far removed from the seat of trouble. For example, should the cuspid be out of line slightly, and the first molar be badly diseased—which is very general—remove the latter and force the bicuspids back to make room for the cuspid.

Evils resulting from irregularities will be next considered. The marred appearance may be the first thing to excite the parent to a realization of the necessity of seeing the dentist. No mother wishes to see her child disfigured in the least, and we feel thankful for this condition of things, else many cases we see now might be allowed to continue. The location of the irregularity in the mouth has most to do with the extent of the deformity. Should it be in the back of the mouth it might not be so readily discovered by any one other than the dentist. Where the expression is changed is its worst form, and this is usually when the irregularity is in the front of the mouth.

Another evil is the affected speech. None of us cares to hear any one converse who whistles through the teeth in attempting to articulate certain words. This condition also is very embarrassing at times to the one affected.

The third evil under this head is possibly the worst of the lot, since it interferes with mastication. When there is malocclusion the mastication is very imperfect, and thereby causes indigestion. Such an evil can readily be understood to be damaging sooner or later to the health of the patient. The prime reason for correction is to improve mastication, not looks. Nonoccluding teeth decay easily, owing to the fact that they are not properly used and are not healthy.

Fourth and last under this head is the caries resulting, which

has already been hinted at. This cannot help being the case, owing to the impossibility of properly cleaning irregular teeth. The tongue and lips ordinarily aid very much in keeping clean the teeth, but they cannot do this in irregular cases.

Advisability of Correction. One must consider the advisability of correction, otherwise he may get into more trouble than he started with. Any correction may be possible, but is it advisable? These are some of the considerations: First, age has much to do with advisability, for the younger the patient the more readily the bones yield to pressure. Resorption and rebuilding of bone is much more rapid while the patient is young. After maturity this condition reverses, making it more difficult to obtain results. If, however, correction is too early, later-erupting teeth may nullify the results already accomplished. Should there be a very extensive operation, it would best wait until most of the teeth have erupted. Second, the health of the patient must be considered. The usual time for correcting the teeth is at about the period of change from childhood to manhood and womanhood. In the female this is a very trying time, and the child should not have any undue nervous strain. Then, too, it is the time of mental development. If the child be attending school full nutrition should be sustained, and this is not possible with teeth sore from moving. In order to stand all the necessary strain the child should be very robust, or the work of correction should not be begun, but postponed until a more suitable time, or, if necessary, never attempted, rather than damage the health. Then the sex of the child should be considered. Man with his beard is able to cover any slight deformity, while woman has to stoically endure it. Woman feels the deformity more keenly and should not be compelled to endure the discomfort. Last under this head is the "Power of Appreciation." At best we are but poorly paid for our labor in any form of corrections, but if the patient shows a thorough appreciation of work done we feel much fitter. Some of those who are fully able able to pay full price for such work are the least able to appreciate it. Consequently, at the time when success is in sight—with the simple wearing of retaining appliance for a short while longer—failure stares you in the face, simply because they see no reason for wearing the appliance longer. In such cases the dentist is blamed for not having accomplished

what he claimed he could. In summing up the advisability of correction, I would say that no dentist is justified in attempting a correction unless he is sure of improving the occlusion, for this is far more important than correcting the looks of the patient.

At What Age May Correction Be Begun? It may be carried on within a wide range of years, beginning as early as the eighth or ninth and extending to the thirty-fifth, or sometimes as late as the fiftieth or sixtieth year. So long as the bones of the body will unite when broken, so long will it be possible to move the teeth and expect them to become fastened with new bone. However, it is not considered wise to attempt to correct teeth after the bones are fully formed, especially in a complicated case. I recently read an account of a woman 75 years of age having her teeth straightened. I would never attempt such a case myself. By moving teeth early in life, we are less liable to strangulate the pulp at the apical foramen, owing to the large opening. Another benefit derived from seeing the child early is this—you may be able to avoid an extreme irregularity, and even have the child correct the cause while the teeth are erupting. A simple suggestion is that the patient press in or out on a tooth disposed to erupt out of line. By this means I have corrected cases that otherwise would have been compelled to wear an appliance.

The physiology of tooth movement and tissues involved is possibly one of the most important parts of orthodontia, and by no means to be neglected if one wishes to understand thoroughly the process. The hard and soft tissues are both involved during this operation, so we shall discuss them in order. First, the alveolar process. This is the outgrowth of another bone, conforming to the shape of the bone to which it is attached. It is the main support to the tooth, forms when the tooth is formed, and is resorbed when the tooth is removed. Should the deciduous tooth be lost very long before the permanent one erupts, the alveolar process is resorbed, and will be reformed when the new tooth comes in. The alveolus, besides supporting the tooth, is very vascular, with nutrient vessels for pericementum and gum. This process has an outer and an inner layer of bone, with a spongy bone between, like the bones of the skull. On account of this condition and its vascularity, the process is more readily resorbed, except late in life, when the bone becomes hardened. Second, the teeth. We are all familiar with the number,

shape and strength of the teeth, which latter enables them to resist any pressure necessary to be exerted in moving them. The difficulty or ease with which they may be moved depends on the thickness of process and number of roots. All teeth are more readily moved in the line of the alveolar arch, on account of the cancellated bone in the interstitial spaces. Third, the pulp. This is the formative source of the tooth, especially of the dentin, and even sends some of its fibers to every part of the tooth. It is this organ that needs to be tenderly dealt with during correction—for a slight injury may result in the loss of its life. Lastly, the pericementum. This is the thin tissue that lines the socket which the tooth occupies, and unites with both tooth and alveolar process. It is the tissue from which the cementum is formed, and should the alveolus be resorbed, this will rebuild it. This tissue is extremely vascular, and has abundant nerve fibers, which being compressed when the tooth is being forced by pressure, cause an inflammation, which in turn causes the formation of the cell known as the osteoclast, which is the cell of destruction. On the other hand, we have a cell known as the osteoblast, whose function is to rebuild bone behind the moving tooth. The process of resorption is much more rapid than that of rebuilding, hence the necessity for retaining appliance. The rate of difference is about one to three. If it should take from six to eight months to get the teeth in position, they should be held there at least a year, if not longer, according to the age of the patient. In summing up, I would be safe in saying that the pericementum has more functions than any other tissue in the body. It retains the tooth in its socket; acts as a cushion to prevent injury to the bony structures surrounding it; contains the blood-vessels which supply nutriment to the teeth and alveolar process; furnishes the tooth with its tactile power, and is the organ of destruction and repair.

DENTAL PRESCRIPTIONS.

BY J. R. MEGRAW, D.D.S., FAYETTE, MO. READ BEFORE THE MISSOURI STATE DENTAL ASSOCIATION, MAY 21-23, 1902.

In accepting your invitation to read a paper I have selected this subject, with the hope of being able to present something that will be of practical value. Dental therapeutics and current dental literature contain so many valuable prescriptions which seem to meet all

the requirements of dental pathology that it may seem I am trespassing upon your time by attempting to advance anything further along this line, but the dental journals contain so many advertisements of local anesthetics and other medicinal preparations that one is led to believe our education along this line is inadequate. Our practice being limited to so small a part of the human body, and the pathological conditions there met with requiring mechanical and surgical to a much greater extent than systemic treatment, prescription writing has therefore been given little attention. Many cases of pulpitis, periodontitis, neuralgia and fetor of the breath are caused by a pathological condition in some remote part of the body, and it becomes absolutely necessary to resort to systemic treatment. Expert legal opinion has dispelled all doubt as to our legal right to administer systemic treatment, and the only question remaining to be answered is: "Are we qualified?" I shall make no attempt to enumerate the various drugs that are incompatible, for lists of these will be found in our text-books on Materia Medica, but I do wish to call your attention to a few points in prescription-writing which should not be overlooked.

The name of the party for whom the prescription is written and the date should never be omitted. The ingredients of a prescription should always be written in Latin and should never be abbreviated in such a manner as to give rise to doubt on the part of the compounder. This will prevent mistakes being made by the druggist. All directions should be written out in full in English. "Use as directed" should never be used, for if in writing the prescription the writer makes a mistake in the dose of any of the ingredients, the druggist is prevented from detecting such mistake, and another reason is that a patient may not always remember correctly verbal directions.

I do not claim originality for all the prescriptions here presented, but I have gathered them from various sources and have found them all of great benefit. There are so many proprietary antiseptic solutions used as mouth-washes that it is hardly necessary for me to give formulæ for others. Among those worthy of mention are listerine, glycothymoline, euthymol, and many others. Glycothymoline is one of the most efficient antiseptics and deodorant mouth-washes we have. It is pleasant to the taste and has a strong alkaline reaction which is very desirable. In healthy condition the secretions of the

mouth are alkaline, but during disease they will be found to be acid. The formula for glycothymoline is supposed to be:

℞ Sod. bibor.
Sod. bicarbon.
Sod. salicyl.....aa. ℥iv.
Thymol.
Menthol.....aa. gr. xvj.
Alcohol.....℥j.
Glycerin.....℥iv.
Aqua destill. q. s.....Oij.

M. This can be used in full strength or diluted as desired.

Euthymol is another preparation which makes a very efficient mouth-wash. The formula is supposed to be:

℞ Acid boric.....℥vi.
Thymol.....gr. xvj.
Menthol.....gr. xij.
Extract baptisae fl.....℥i.
Ol. gaultheriae.....gtt. ix.
Ol. eucalypti.....gtt. xij.
Alcohol.
Aqua destill.....aa. Oj.

M. This solution also can be used in various strengths, but as it has an acid reaction I prefer to use some other preparation.

Seiler's solution is a preparation worthy of notice as a mouth-wash. It has an alkaline reaction and leaves a very pleasant after-effect.

℞ Thymol.....gr. x.
Menthol.....gr. v.
Ol. eucalypti.....gtt. x.
Ol. gaultheriae.....gtt. vi.
Sod. benzo.
Sod. bibor.
Sod. salicyl.....aa. gr. xx.
Glycerin.....℥ss.
Alcohol.....℥j.
Aqua destill. q. s. ad....℥viij,
M.

Where an astringent and anodyne wash is required I prescribe:

℞ Tinct. kramer.....ʒj.
Tinct. opii.....ʒij.
Tinct. myrrh.....ʒiij.
Aqua camphor. q. s. ad.....ʒviij.

M. Sig. Dilute with two to four parts of water and use as a mouth-wash.

In inflamed and spongy gums, where the patient often complains of bleeding when brushing the teeth, I use:

℞ Plumb. acetat.....gr. x.
Tinct. opii.....ʒj.
Aqua rosae q. s. ad.....ʒj.

M. Sig. Apply on cotton two or three times a day. Shake well before using.

During the eruption of the third molar the adjacent tissues often become highly inflamed and we find a collection of pus. In these cases I prescribe:

℞ Aqua hydrog. dioxid.
Aqua hamamelid. spirituos.
Glycothymoline.....aa. ʒj.

M. Sig. Dilute with equal parts of water and use as a mouth-wash.

Fetid breath is another disease with which we very often have to deal. It may be caused by a decayed tooth, an accumulation of tartar, any form of stomatitis (especially pyorrhea alveolaris) diseases of the nose and throat, tonsilitis, or any disease of the alimentary canal. All of these diseases may be benefited by the use of antiseptic and deodorant washes. In tonsilitis surgical treatment will often be found necessary. When resulting from diseases of the stomach I have found the following to be of great benefit:

℞ Carbo ligni.
Pepsin saccharat.....aa. ʒij.
Hydrarg. chlorid. mite....gr. vj.

M. Divide in capsules No. 24. Sig. Take one capsule three times a day two hours after each meal. Two teaspoonsful of glycothymoline in a little water, or Seiler's solution in equal parts of

water, taken twice a day, will be found a great aid to the above prescription.

In cases of pulpitis and periodontitis great benefit may be derived by internal medication. When periodontitis is caused by mechanical irritation the inflammation generally soon subsides if the cause is removed, and very little further treatment is required; but often we find the peridental membrane in so highly inflamed a condition that very little work can be done on the tooth. In these cases 5 gr. doses of phenacetin, acetanilid or antipyrin taken every two to three hours will be found very serviceable. When pulpitis or periodontitis is of a malarial origin I find that the addition of quinin and codein with any of the above drugs acts admirably. The prescription I generally use is:

℞ Acetanilid.
Quin. sulfat.....aa. gr. xxiv.
Codein sulfat.....gr. j.

M. Div. in capsul. No. 8. Sig. One every two to three hours.

Very often we find in patients who suffer from gout or rheumatism cases of pulpitis and sometimes periodontitis. In these cases I prescribe:

℞ Sod. salicyl.....ℨiij.
Tinct. belladon.....ℨij.
Aqua destill. q. s. ad.....ℨiij.

M. Sig. Dessertspoonful every four hours.

During and particularly just before menstruation women are subject to affections of the teeth the same as during pregnancy. These affections are generally congestion of the pulp and the periosteum. At this time there is an engorgement of all the blood-vessels which may produce by reflex action neuralgia of the trifacial nerve. In these cases I know of no better remedy than ammonol, 5 to 10 gr. doses every two hours.

Another class of periodontitis to which I wish to call your attention, and which is very often met with in practice, is a considerable swelling of the adjacent tissues. It is generally caused by infection, and the tooth will be found in a condition too painful to permit a thorough cleansing and disinfection of the root canals.

In these cases I give 5 gr. doses of ammonol or phenacetin to relieve the pain, and to reduce the swelling I prescribe:

℞ Tinct. opii.....3ij.
Liquor plumb. subacetat dilut..3iv.

M. Sig. Apply to face on cloths, changing every hour.

I also administer a saline cathartic, such as magnesia sulfate, Hunyadi water, or a Seidlitz powder. As a local application in acute periodontitis I have derived great benefit from antiphlogistine. In applying it the gum over the root of the tooth should be thoroughly dried and the drug should be covered with a piece of linen.

In controlling hemorrhage after extraction internal medication will be found beneficial. I first pack the socket with cotton saturated with an aqueous solution of suprarenal extract. Internally I administer:

℞ Tinct. digitalis.....3iss.
Tinct. catechu.....3j.
Extr. ergot. fl. q. s. ad.....3ij.

M. Sig. Dessertspoonful every two hours until hemorrhage is checked.

The fluid extract of hydrastis canadensis, 20 to 30 drops in water every half hour, will also act admirably as a hemostatic. In all cases of extraction where I fear excessive hemorrhage I inject with the solution of cocain 3 to 5 drops of adrenalin chlorid solution, 1 to 1,000.

Under the head of local anesthetics I wish to call your attention to only two formulæ. Hypodermic solutions should be made fresh. I use the tablets manufactured by Parke, Davis & Co. according to the formula of Dr. N. S. Hoff. Each tablet contains:

℞ Cocain hydrochlorat.....gr. ss.
Morphin. sulfat.....gr. ⅛.
Atropin. sulfat.....gr. 1-200.

Dissolve one tablet in 30 minims of water and inject 5 to 10 minims.

A preparation very similar to vapocain is:

℞ Cocain hydrochlorat....gr. xviij.
Alcohol.....3i, mix and add
Ether.....3i.

This contains 15% of cocain and I use it in sensitive cavities, in removing the pulp, and in all other cases where I desire to make a local application of cocain. Very often after cocain has been administered hypodermically we find a tendency of the patient to gag or vomit, especially is this true when the patient has been suffering with pain and when the stomach is empty. This vomiting can be instantly arrested by administering oxalate of cerium in one grain doses, or by the aromatic spirits of ammonia, one half to two drams in an ounce or more of water.

There are other drugs and prescriptions to which I should like to call your attention, but I feel that I have already taken up too much of your time. Dental materia medica is in a state of evolution and a thorough knowledge of it will enable us to become better practitioners of dentistry and more of specialists of medicine.

COMPARATIVE ANATOMY OF THE TEETH.

BY D. F. LUCKEY, D.V.S., COLUMBIA, MO. READ BEFORE THE MISSOURI STATE DENTAL ASSOCIATION, MAY 21-23, 1903.

It would be impossible to take up a detailed discussion of my subject in a limited space of time. I know from the length of time that dental students put in in completing their course that a great deal of it must be devoted to the study of the anatomy of the teeth. Of the knowledge of the anatomy of the human teeth which they acquire I am almost entirely ignorant. Neither have I an extensive knowledge of the anatomy of the teeth of the lower animals. In fact, up to a few years ago very little time was given to the study of the teeth or of veterinary dentistry in the veterinary colleges. The anatomy of the horse's teeth was given a mere glance, and that of the other animals was neglected. Students in many cases had to depend upon fake side schools for a course in veterinary dentistry. As a usual thing the dental schools charged a handsome fee, maintained a very large sign, and gave a very large diploma, but a very limited amount of knowledge of the subject. The veterinary colleges of the present day all give a very thorough course in veterinary dentistry, but the practitioner of to-day who graduated years ago has had, as a rule, a very limited college training on the subject. The most of his knowledge has been acquired by practice, or as the quacks would say, "just picked up," and does not include much

anatomy. In presenting this subject I shall not attempt to say anything whatever concerning the human teeth. I wish only to call attention to a few of the variations which appear in the tables of dentition, to some of the characteristics of the teeth of the horse, and, digressing from my subject to some extent, to mention some of the points in regard to veterinary dentistry which I hope will impress my hearers with the importance of the subject. I will let the dentists present make the comparison in their own minds, as I cannot attempt to draw it in detail.

"The teeth are objects implanted in and protruding from the maxillary alveoli. They are characterized by the hardness and density of their specific tissues. Like bone, these tissues consist of earthy salts, with a basis of organic animal matter. They are harder than bone, which contains about 67%, while teeth contain 76½% of earth salts. One material physical difference between a bone and a tooth is that the free portion of the latter bears exposure and friction with impunity, while the former cannot endure either without becoming diseased. Teeth vary with the class of animals in number, size, form, structure, position and attachment, but in all cases they are in correlation with the food and generic habits of the animal. Thus in herbivora, where grinding of the food is necessary, the contact surface of the molars is rough and flat. In carnivora, where tearing and crushing are requisite, the molars are sharp, pointed and serrate; in omnivora, where the food is general, the teeth are mixed in character. The form of the teeth thus depends upon the natural food of the animal; and there is always a certain harmony between their disposition and the conformation of correlated organs. They are not found in all animals. Birds have none, while the typical number of mammalian teeth, as viewed by Prof. Owen, is forty-four."—*Strangeways.*

Herewith are the dental formulæ of the permanent set of the horse, cow, sheep, pig, dog and cat. All these animals have the temporary set, which gives way very regularly to the permanent one:

——Horse.——				——Cow——		
I.	C.	M.		I.	M.	
3-3	1-1	6-6		0-0	6-6	
—	—	—	= 40	—	—	= 32
3-3	1-1	6-6		4-4	6-6	

——Sheep.——					——Pig.——				
I.	M.				I.	C.	P.M.	M.	
0-0	6-6				3-3	1-1	1-1	3-3	
—	—	=	32		—	—	—	—	= 32
4-4	6-6				3-3	1-1	1-1	3-3	

——Dog.——					——Cat.——				
I.	C.	P.M.	M.		I.	C.	P.M.	M.	
3-3	1-1	4-4	2-2		3-3	1-1	3-3	1-1	
—	—	—	—	= 42	—	—	—	—	= 30
3-3	1-1	4-4	3-3		3-3	1-1	2-2	1-1	

You will notice that the cat has two more teeth above than below, and that the dog has two more below than above. The teeth of the cat and dog are composed of dentin, with a beautiful covering of white enamel. The teeth of the pig seem to be composed entirely of enamel. Of all of the lower animals these teeth have the roughest work to do, yet the enamel is thin, the dentin is wanting, and the pulp is comparatively very large. The tooth is strong but highly sensitive. In its structure we see a beautiful device upon the part of nature to prevent injury to it by the violent work it has to perform. The cow and sheep create the sensation in the dental world by having no incisors above. The same is true of the goat. The lower incisors and molars of the cow in structure resemble very much the teeth of the horse. In the horse the male has four cuspid teeth, which are wanting in the female. We can therefore distinguish the sex of the horse by the teeth. Another important fact concerning the teeth of the lower animals is that they are almost a perfect index to the age. The temporary teeth are replaced by the permanent ones with great regularity, and the subsequent wear of the teeth of the horse is so uniform that his age may be ascertained from them at any period of his life. I shall not dwell upon the changes which occur in the teeth of any of the lower animals except the horse, but later on I shall call attention to some points in connection with his teeth by which we are guided in ascertaining his age.

"Three hard structures enter into the formation of the teeth—dentin or ivory, enamel, and cementum or crusta petrosa. Dentin constitutes the major part of the tooth, and is a hard, yellowish

substance, consisting of very minute tubuli, embedded in a dense, granular, intertubular matrix, which contains the bulk of the earthy matter, the latter being about thirty per cent of the whole. The tubuli commence at the pulp cavity and radiate to the superficies of the dentin, where they anastomose, and their branches terminate in minute cavities, the dental cells, which perhaps are analogous to the lacunæ of bone. The tubuli are about one four-thousandth of an inch in diameter, and in the fresh state they contain processes from the pulp. In appearance enamel is distinguished by a peculiar whiteness. It is the hardest animal texture, containing about ninety-six per cent of earthy salts. It consists of hexagonal prisms, which are arranged side by side, with one extremity resting on the surface of the dentin, whence they are disposed in gently waving lines toward the surface of the tooth. They vary somewhat in diameter, but average one five-thousandth of an inch. No nutrient vessels or nerves have been traced into enamel, and when destroyed it is not reproduced. This tissue is protective, sometimes covering the entire exposed surface of the tooth, as in the human subject and the dog; and it also furnishes the rough projection and cutting edges found in the teeth of some classes of animals, the herbivora affording a good example. Crusta petrosa or cementum, the third constituent, completely covers the imbedded tooth and occupies the cavities of the free portion, where such exist. It is thickest towards the roots, most abundant on the molars, and is distinguished by its brownish-yellow color. It is the softest dental texture, closely resembling true bone in structure, having tubuli and cells resembling the canaliculi and lacunæ, and where it is thick it may be traversed by vascular tubes analogous to the Haversian canals. The proportion of earthy matter, the same as in bone, is about sixty-seven per cent."—*Strangeways.*

The molar teeth of the horse are very large and extremely well adapted to the work they have to do. On inspection of a molar we see that in general its shape is that of an elongated cube. The external and internal surfaces are marked by prominent longitudinal grooves, the free portions of which are filled with crusta petrosa. The tooth at first is three to three and one-half inches in length, with a crown about one-half to three-quarters of an inch high protruding above the gums. The remainder of the

tooth is implanted in the gum and alveolus. The lower end of the fang contains the pulp cavity, which is comparatively very small. The pulp keeps well away from the table surface. Except near the lowest extremity the tooth appears to have a very limited nerve supply, and is consequently almost devoid of sensation. As the animal advances in age the crown wears away and the tooth moves up bodily from the alveolus to meet the wear. This process continues until in the very aged animal the wear amounts to the length of the root and neck. The crown alone is left, with roots so short that they are insufficient to hold the tooth in place. It is no uncommon thing to find an old horse with some of his molars wanting.

The crusta petrosa forms the outside covering of the tooth, dips into grooves formed by the folding of the enamel, and in the molar is thickest on the crown. In the upper molar of the horse the external crusta petrosa is reflected up the inside of the tooth in two columns, which are surrounded by enamel, forming the infundibula. The dentin enters into the structure of the tooth. The relation of these substances in the structure of the molar is the same from the crown surface almost to the lower end of the root. If the tooth is cut across anywhere down to the last three-fourths of an inch, it will be found to present the same appearance. The enamel being the hardest of the substances present on the table of the tooth, it wears slowest. The dentin and crusta petrosa wear faster. Owing to this variation in the wear of the different structures the crown of the tooth is roughened, adapting it to its work.

The permanent molar teeth of the horse number twenty-four, of which six are above and six below on either side. They are all very much alike in structure and appearance. The fourth permanent molar comes into wear at the age of one year; the fifth at one year nine months; the first and second at two years six months; the third at three years six months, and the sixth at four years. The first, second and third replace temporary molars. In their formation and growth the permanent molars absorb the roots of the temporary ones. The first three molars are sometimes spoken of as the premolars, but as a general rule the molars are referred to by their numbers, from one to six, the numbering beginning with the molar nearest to the incisors.

An incisor which has been split longitudinally shows the different

parts of the tooth and the relation of the different structures. The crusta petrosa forms a very small part of the tooth. A thin layer of it covers the root, and is reflected up the internal dental cavity. The external enamel is comparatively thick; that surrounding the internal dental cavity very thin. Enumerating from the outside of the crown surface or table of the tooth, we have the external enamel, the dentin, and then enamel again. The enamel which we come to in the middle of the crown dips down into the body of the tooth for probably one-fifth of its length. In this enamel is situated a cavity called the *dental cup* which, like the table, is oblong from side to side. As is the case with the molars, the incisor moves up bodily from the alveolus and gum to meet the wear, so that the cup disappears first, then the thick enamel. At about the time the enamel disappears the interdential cavity reaches the table. The pulp contained in the interdential cavity recedes and the cavity is filled up with osteo-dentin. Soon after the enamel disappears from the back part of the table surface, or probably before it disappears, the osteo-dentin appears toward the front border. The osteo-dentin has a yellowish color, varying from that of the dentin to such an extent that the difference is easily detected. The part of the table occupied by the osteo-dentin is called the dental star, which is very small at first, but increases in size as the wear of the tooth proceeds.

The anterior surface of the young incisor tooth presents a triangular shape, with the base at the table. As the wear proceeds it will be noticed that the tooth narrows from side to side. Viewed laterally, the tendency of the tooth is to be triangular, with the apex at the table. It will therefore be seen that the table of the middle incisor, which is oblong from side to side at three years old, changes in shape until it becomes oblong from behind forward at the age of twenty. As it wears it narrows laterally, but its short axis widens. It is by means of the changes which take place in the incisor that the age of a horse may be determined. I do not think that the human teeth are any index to the age.

A horse has twelve incisors, six above and six below. Enumerating from the outside, they are known as the corner, lateral and central. The two-year-old horse has a full set of temporary incisors, which sometimes resemble the permanent ones of the five-year-old so much that to decide on the age it becomes necessary to examine

the molars. This is the only case where the molars need be taken into consideration in determining the age. The central incisor comes into wear at three years of age; the lateral at four; the outer edge of the corner at five, and the inner edge at six. From that on every change that takes place in the middle incisor in one year takes place in the lateral the following year and in the corner in the second year following. At three years of age we notice the presence of the permanent central incisor; at four, the lateral; at five, the corner. At six the inside edge of the corner comes into wear. The various appearances which the table of the central incisor takes on are as follows: At three years, oblong from side to side; at six the cup disappears; at nine the table is oval from side to side; at eleven the central enamel disappears from the back part of the table and the dental star appears on the front part of it; at fifteen the table is triangular; at twenty it is flattened from behind forward. These appearances are shown by the lateral incisors one year following and by the corner incisors two years following. Thus we are able to tell the age of a horse up to about twenty-three years of age. After that time we have nothing more definite as a guide than the dental arch itself, which in the young animal resembles in shape the arc of a circle, but in the very old animal forms an acute angle. It is seldom a matter of much importance to know the age of a horse when he is over twenty-three.

The arrangement of the teeth of the horse is such that there is between the incisors and molars a vacant space, known as the interdental space or diastema. The cuspid teeth, which are present only in the male, are located in this space.

The cow has thirty-two teeth, of which eight are incisors and twenty-four molars. Her teeth are arranged so as to leave the interdental space. All of the incisors are in the lower jaw, the upper jaw being left without any. The appearance of the permanent incisors of the cow takes place as follows: At two years the central; at two years six months the lateral central; at three years the lateral; at three years and six months the corner. The fourth permanent molar comes at six months, the fifth at one year three months, the sixth at two years, the first and second at two years six months, and the third at three years.

There are not many different operations to be performed in the

ordinary practice of veterinary dentistry, the horse being the only animal upon which we operate. Next to a fair understanding of the horse's head, mechanical genius is the most necessary qualification of a dentist. Neither local nor general anesthetics are used. Styptics are seldom needed, dangerous bleeding, as a rule, being stopped by mechanical appliances. The teeth of the horse are not sensitive enough to require anesthetics. It is doubtful if ever a horse has what is commonly known as toothache. His teeth seldom if ever decay, and except in the rarest cases filling is unnecessary. There are a few operations, however, that are often needed, the neglect of which not only decreases the value of the horse, but leaves him to undergo a great deal of suffering.

The most common irregularity of the horse's teeth is a ragged condition of the outer edge of the table of the upper molars and of the inner edge of the table of the lower ones. The motion of the jaw in grinding the food is from side to side. The wear of the teeth takes place in such a fashion that the longitudinal fold of enamel, where it comes to the outer edge of the table of the upper molars, is not worn as fast as the rest of the table and protrudes downward and outward in a sharp point. We frequently find on running the finger along the outer edge of the upper molars a number of these points protruding in such a fashion that a continual laceration of the buccal membrane is going on. The tongue is also lacerated by the points, which likewise develop on the inside of the lower molar. The operation for correcting this condition is known as "floating" the teeth, and is the most common and useful operation practiced by the veterinary dentist. It consists in rasping off the sharp points with an instrument made for that purpose. While the operation is a very simple one, it is of the greatest possible value to the horse.

As a result of violence the molar teeth get split and broken, and the pieces have to be removed. Less often the wear of the molars is so extremely irregular that, instead of the table surface wearing down flat, the upper molar overlaps the lower one. The wear takes place on the inside of the upper and the outside of the lower molar, so that both rows become wedge-shaped. The table is a sharp edge, and abuts against the opposite gum, setting up an extreme irritation. This condition, known as "scissor-mouth," is corrected by simply

clipping off the molars down close to the gums, and allowing them a chance to wear naturally.

Sometimes, when a molar is harder than the one opposing it, it grows faster than it wears and gets longer than the other. The opposing soft one wears faster than it grows, and is shorter than its companion. The difference in length of the molars is sometimes very great, varying from that caused by the difference in hardness to that caused by a total absence of any opposing wear. If from any cause a molar tooth is removed the one in opposition has nothing whatever to wear against. The crown will therefore continue to increase in length until it reaches the gums of the opposite jaw. From that time on it becomes impossible for the horse to eat, and I have seen horses which, while standing amidst feed and grass, were starved almost to death as a result of this condition. In such cases we find it necessary to clip the tooth off or to pull it out.

Horses frequently undergo inconvenience from the shedding of the temporary teeth. The first and second molars cause the most trouble, often setting up constitutional disorder when the animal is two years past, which hinders its growth materially.

The most painful disorder of the horse's teeth is the condition we call "ulcerated tooth." Though the pulp is comparatively small, when it is involved in the process of suppuration, which often takes place at the lower end of the root, it is the object of great pain. The only remedy which will afford relief is the extraction of the tooth. If the suppuration has gone on for some time, the bony structures may be and frequently are involved in the inflammation and necrosis. The extraction of the tooth must then be followed by the removal of all necrosed bone. Before the process of suppuration continues very long the pus usually finds an outlet, after which the horse does not suffer so much pain. If a lower-jaw tooth is affected, the outlet may be either on the inferior border of the ramus or through a fistula which runs along the tooth to the gum. In the upper jaw the fistula may take its course along the side of a tooth, but it often leads into the maxillary sinus. The sinus fills with pus; the surrounding bones become involved in the process of inflammation; and if the condition is not promptly treated a very heroic operation is required to correct it. It often becomes necessary to remove the turbinated bones and others through an opening made by trephining the

superior maxilla. The operation is rather tedious, and is disagreeable on account of the extremely offensive odor of the dead bone.

The extraction of the horse's molar tooth is a simple matter, but requires a good deal of force. It is sometimes difficult to tell which tooth to pull, and some skill is required to pull one of these large teeth without breaking it off. When the tooth is broken off it becomes necessary to trephine in order to get it out. With the trephine an opening is made through the jaw-bone, in the line of the tooth, down to the lower end of its roots. Then, with a punch made for the purpose and a light hammer, the tooth is punched out. This may appear to be a very heroic operation. It is, however, absolutely necessary, and I doubt if the pain occasioned thereby is any more severe than what the horse suffers daily from the diseased tooth. As soon as the operation is completed he is ready to begin to eat, and in a few days his condition shows improvement and the glare of pain leaves his countenance.

There are other unnatural conditions of the horse's teeth which require the dentist's care, but I did not start out to mention all. The brief attention which I have called to these few diseased conditions is intended only to leave a partial impression of what our most faithful servant may suffer from disorders of his teeth; and to solicit for him your passing notice and sympathy.

METALLURGY.

BY D. R. STUBBLEFIELD, M.D., D.D.S., NASHVILLE. READ BEFORE THE MISSOURI STATE DENTAL ASSOCIATION, MAY 21-23, 1903.

When I asked your esteemed president to designate a topic upon which I might contribute my little to this meeting his reply was: "Take a subject like 'Metallurgy in *Dentistry* or any other old place.'" To say that I was shocked expresses too mildly the sensations that crowded thick and fast upon me, but when I had read his suggestion over several times, and had taken the measures of all the circumstances, it began to dawn upon me that he was sane as ever—just about—and that the subject might be utilized even on such an occasion as this. It seems to me that we might think and talk about metallurgy, at least in a general way, with some degree of interest if not profit. I would not intimate that I think such an

opportunity should be taken advantage of to unload a tidal wave of college platitudes upon you who have put yourselves innocently at my mercy, but I mean that possibly I might set all your minds going by placing just enough matter before you to encourage a free expression and get you to say those things that you have been accumulating from birth—for I think all of us have been unconsciously studying the subject all our lives.

Well, silver was once used in dentistry, but it could not stand the hot competition and had to drop out of the race. We found that our silver spoons would get black when we ate soft-boiled eggs with them. Upon investigation we found that the sulphur of the egg had formed silver sulphid upon its surface. A great many people talk about *oxidized* silver when buying silver ornaments, but we know the jeweler puts that black on by subjecting the silver article to the action of the fumes from burning brimstone. Therefore, when we were told that silver had failed in dentistry our minds went right back to those black silver spoons, and we knew the formation of that sulphid between the silver base plate and the vulcanite attachment prevented its ever getting a practical hold on it. And that's the chemical fact in the case.

After a while there came into use another and quite similar metal, called *aluminum* by everybody except chemists. Aluminum resembles silver in more ways than one. It is just as good a conductor of heat and electricity, both ranking at the top, can be equally as well beaten and rolled into plate, and will resist the force of rupture about the same. It is easier to melt, much lighter (about one-fourth the weight of silver), and more abundant, for every clay bank is an aluminum ore bed. Since we have found out how to separate it cheaply, expensiveness having kept it as a laboratory product for a long time, we may put it to general use. Sulphur does not form a black sulphid with it, and even H_2S does not throw down a precipitate when added to a solution, as in so many other cases of the metals. Air does not *weather* it. Strong, *boiling* sulphuric acid does dissolve it; nitric acid does not touch it; although hydrochloric acid, hot or cold, will dissolve it readily. The strangest thing about it in this connection is that *alkalies* will dissolve it. If you want to "frost" some silver, you put it in diluted nitric acid, but you "frost" aluminum by a weak solution of caustic soda or potash. This

weak resistance to alkaline fluids is one reason why it has not fulfilled the early promises made for it in our profession. Some mouths especially act so rapidly on the base plate of aluminum (cast plate preferred) that it has proved a disappointment. Another reason for this disappointment is found in the fact that it cannot be soldered with the proportional strength, certainty and ease that silver can be, or that is required for good results. For a long time it was thought to be impossible to solder aluminum. My personal opinion is that this was due to the fact that the fluxes used ordinarily for work going into the mouth were either borax or some other alkaline substance that would act upon this metal; or muriatic acid, which, as we have seen, dissolves it either hot or cold. Because the reasoning was defective the conclusions reached were also defective. When better sense was applied it was found that it was possible to solder, although it does seem that the results obtained are not as substantial as they should be. It is performed either like a tinner, using a soldering iron, or by clamping the parts together and bringing about a kind of "sweating" union. The solder is placed between the parts before clamping, and the surfaces must be properly cleaned beforehand.

But what about a *flux?* This is a point out of the ordinary, and has therefore been a stumbling block in the way of the general use of the very promising metal. All sorts of substances except the time-honored fluxes are resorted to, such as vaselin, mutton suet and lemon juice, and with several kinds of gums are preferred by different workers.

The solders are also various. The special solder that is always based on or at least partly composed of the special metal to be united is most in evidence. We find that gold, silver and copper, because of their average high-fusing point, are called the *hard,* and tin and bismuth the *soft* solders. Of the *special* variety, we find gold, platinum, silver and aluminum, or tin, zinc, silver and aluminum, as examples. Others of the same class are composed of zinc, 80-92 %, and aluminum, 20-8 %, respectively; also, cadmium 50 %, zinc 20 % and tin 30 %. The different uses call for a change of proportion of one or the other or all of the constituents. For instance, when a strong, tenacious soldering is required, increase the cadmium; where great adhesion is desired a large proportion of

zinc should be used; and where a nice, durable polish is wanted a greater per cent of tin should be used. The ingenuity of the worker plays a great part in the work of adjusting the proportions, as well as the technical results of this special work, as it does in any field of practical endeavor.

After all, however, the best results in the mechanical arts, whether in or out of our profession, have been obtained from the alloys of this metal. The excellent properties of aluminum modified by judicious union with such metals as gold, copper, silver, and that alloy of wonderful usefulness, brass, give us the forms best suited to back up the claims which have offered so much. There are some fields in which it is without a rival. For making small weights and strong, rigid instruments, where strength and lightness are demanded, it must always be valuable. But the statements that dazzled me as a boy, that it was going to replace iron and several others of our most valued metals, can be confidently discounted. In ornamentation, in wares, and in optical or astronomical laboratories, its use is rapidly assuming a front rank; but in the commercial arts it will assist but never supersede. Its polished surface does not *wet* easily enough to produce the ideal keel for the race shell, although it was highly exploited on theory, and I suspect that that same quality acts in part to keep it out of the first rank as a base-plate with us. That, by the way, is its chief use in our profession. By means of counter-sunk holes or spurs graved on the ridge, a secure attachment of vulcanite can be obtained. The skilled workman can produce good results, but the uncertain tenure of existence, by and large, has not been found to repay the difficulty of production. Therefore, I cannot but feel that aluminum has proved a disappointment in our world—though the last word has not been said, as I am well aware.

Discussion. *Dr. H. Prinz,* St. Louis: As Dr. Stubblefield has pointed out, it is a well-known fact that we cannot vulcanize rubber upon a silver plate without destroying its integrity. The sulphur present in the rubber will attack the silver on account of their great chemical affinity, forming silver sulphite. On the other hand, we know that those metals which form *no* compounds with sulphur do not take a firm hold upon the rubber. Paradoxical as it seems to be, it is nevertheless true that the percentage of silver present as an alloy in gold plate or any other plate-material is *the* agent which

forms a close union between the plate and the vulcanite. Dr. Yung, of Heidelberg, has shown by actual experiment that it will require from 150 to 200 pounds weight to detach rubber from gold 16 to 20 carats fine; while on the other hand pure gold, aluminum, platinum, etc., form practically no direct union with the vulcanite. It is therefore of the greatest importance to alloy those metals upon which we wish to vulcanize with at least 20 per cent of silver. Aluminum should be alloyed in the same way, and I have no doubt the rubber will adhere to it perfectly. As we cannot solder aluminum in the ordinary way, spurs and counter-sunk holes are placed upon and in the plate, to provide means for mechanical retention of the rubber. As far as I know the various solders advocated for aluminum have not proven to be practical. Mr. Richards of Philadelphia, a well-known authority upon aluminum, has suggested the use of phosphorus as a flux, and he has succeeded in uniting aluminum in this way by using a solder somewhat similar to the ones Dr. Stubblefield has enumerated. I have not tried it. In Europe aluminum covered with a thin layer of copper is quite frequently employed for a basis of artificial dentures. The plate is properly swaged, lugs are soldered in place, the teeth are vulcanized in position, and then the ready plate is submerged in dilute nitric acid, which will remove the exposed galvanic deposit of copper. The aluminum itself is not affected by this acid. I have tried it and found it satisfactory. A new alloy of magnesium and aluminum, termed magnalium, has lately attracted some attention in dentistry. Judging from reports, it does not prove to be superior to aluminum.

Dr. R. C. Brophy, Chicago: The aluminum we use in dentistry is not pure. The dental supply houses, in procuring their stock of plate aluminum for the trade, simply buy the aluminum which is sold for commercial purposes. I investigated the subject and found that the pure aluminum can be obtained only by purchasing it from the principal house—perhaps the only house—in this country direct by special order; for it is not upon the market, and can be obtained only by special order from the house which produces it. It is well to know that the plate aluminum which we use is full of impurities. In regard to the alloying of aluminum, I have for quite a number of years made an alloy of aluminum and silver, as suggested by Dr. Prinz, and I am firm in the conviction that this alloy will with-

stand the effects of the secretions of the mouth; furthermore, I find the tendency of the vulcanite to warp is overcome by the use of this alloy. By the way, there is one suggestion I would like to throw out, and that is, when the base-plate is made and spurred, if instead of using the ordinary vulcanite and placing it in contact with the metal you will put on a thickness of what we call weighted rubber, you will find it will persist in hugging and will not warp away as the pure or straight vulcanite does.

FILLING TORTUOUS ROOT CANALS.—Prepare brass wire thirty-six gauge, by drawing it around a smooth excavator handle several times to stiffen it. Cut the wire in suitable lengths and taper them to desired shape with a fine file when wanted. The wire can be held conveniently in a broach holder. Work the canal full of chloro-percha with a smooth broach and then insert the brass point, passing it into the canal as far as possible. Remove the broach holder and with a small, sharp chisel cut the excess wire off. This method should not be adopted in filling large canals, as there is danger of forcing the wire through the apical foramen.—C. J. Hadley, Chicago, *Review*.

POWDERED CHARCOAL AS A TREATMENT FOR HEMORRHAGE FOLLOWING TOOTH-EXTRACTION.—By Dr. Arthur Masur, Breslau, Silesia (*Deutsche Zahnarztliche Wochenschrift*). Notwithstanding that hemorrage following tooth-extraction is easily arrested, yet, says the author of this paper, there are some cases which require special attention. He discusses the means usually employed for arresting hemorrhage due to the extraction of teeth, states that stypticin and gelatin solutions do not always give satisfactory results, and advises the use of charcoal powder, which he has successfully employed for the last three years. His *modus operandi* is as follows: The alveolus, which is freely irrigated with pure water, is dusted with charcoal powder, and to "insure better adaptation of the charcoal to the bleeding capillaries it can be packed into the alveolus by means of cotton." There is also another and very easy way of carrying the powder into the alveolus—by means of a damp cotton tampon, which is made to take up the charcoal and is then introduced into the canal. The powder is allowed to remain two minutes in the alveolus, and is then washed out with a strong stream of water. In cases in which it is desirable to leave a packing over night, the use of iodoform gauze impregnated with charcoal is recommended, although the essayist states that he has never had to recur to this procedure, as he has always been able to arrest hemorrhage in these cases with the simple application of charcoal powder. The action of the charcoal powder is supposed to be a merely physical one, the closing up of the openings in the capillaries with the charcoal granules. Incidentally, it is also stated, the charcoal has the property of hastening the healing of the wound, and its union with the tissues of the wound is very intimate, as it takes a strong stream of water to dislodge it.

Digests.

ETHNOGRAPHIC ODONTOGRAPHY. By A. H. Thompson, D.D.S., Topeka, Kan. Read before the New Jersey State Dental Society, July, 1902. The studies of the writer in the field of comparative odontology led by a natural sequence to ethnic odontology and the desire for knowledge concerning the different characteristics of the teeth that might exist between the different races of mankind. It had been observed by various writers that there were some differences between the lower and the higher races—that the teeth of the lower were larger and coarser and nearer to the apes below them, and that the teeth of the higher races were more refined and degenerate in form and structure and more susceptible to disease, but beyond this vague generalization there seemed to be but little known. The literature of the subject proved to be very unsatisfactory when searched for definite information in regard to anatomical features that had a real ethnic value. What observations have been made have regard mainly to dental and oral diseases, abnormalities, etc., and very little in reference to variations of form or type. This lack of material for scientific generalizations of the ethnology of the teeth has been bewailed by many writers. The dictum that Mantegazza gave forth many years ago still holds good—that "An ethnological study of the teeth has yet to be made, and when made, will reveal distinctive characters of great importance." This observation holds true to-day, so that it has been a matter of great disappointment to the writer to find in the pursuit of reliable data upon which to found observations that even the physical anthropologists, those who make a minute study of somatological characteristics, have so little to offer regarding the macroscopic features of the teeth, which we as dentists are accustomed to observing. Some of the leading anthropological writers, it is true, do give some general observations (some of which are erroneous) about the teeth, but do not observe the special morphological features at all. Thus a famous lecturer of the anthropological school of Paris said some time since of the teeth of the Mongols that "They present nothing remarkable, either as to size or shape!" Such observations, or the lack of them, do not suit us as dental specialists. And this, in contrast with the minute and painstaking observations he gives regarding the various

indices of the skull and jaws which he worked out on these same people so thoroughly and completely as to have a distinct and positive ethnic value. But the teeth, for some curious reason, while acknowledged to present great variations that might be utilized, do not seem to have been studied as much as other parts of the body, parts which do not always present as much variation. This neglect seems unaccountable.

Failing to find in literature the information desired, the writer set about corresponding with various scientific men who could likely direct him to sources where the data desired could be found, or furnish something from their own observations that would be of value. But here a greater disappointment awaited him, for the general reply was that the subject of the ethnology of the teeth had been sadly neglected and should be investigated. So it seemed that the data from which to make any general deductions was entirely wanting: i. e., such data as would seem to be indispensable to us as dental specialists, accustomed as we are to the great variations of the anatomical features of the teeth as they come under our observation in daily practice. We cannot but believe that there must be differences in the morphological features of the teeth, as between races, that ought to have a positive diagnostic value. It seems that we as dentists ought to contribute to the creation and the working out of the science of ethnic odontography that might be of service in the field of physical anthropology. We have a more positive and minute knowledge, both scientifically and practically, of the macroscopic features of the teeth and of their variations, and are in many ways better equipped to do this work than the general anatomist and anthropologist. Especially is this true since in our colleges students are being trained as never before in the details of human odontography which will fit them for such scientific work. The writer would take occasion to urge upon graduates the importance of attention to this science and the value that any contribution to it would be. Educated dentists are now scattered all over the world and are in contact with nearly all the various races of mankind, and I would urge them to study the races at their doors in reference to the variations of the anatomical characteristics of the teeth. They could thus aid in the creation of a new science and be of service to the world in the accumulation of knowledge.

Of course many minute anatomical features of the teeth are difficult to so isolate and classify as to make them of positive ethnic value. The variations even between the individuals of any one race, especially of the higher races, are so considerable as to make the variations as between races still more difficult to differentiate. The whole gamut of the possible variations of the teeth seems to be presented by the individuals of every race, which makes it still more confusing. This fact seems to lessen the chances of being able to distinguish distinctive features that might have an ethnic value. But this great variation of the anatomical features of the teeth indicates that we have a mass of evidence that must mean something. We must consider that the accumulation of facts bearing upon any science, the most of which seem at first to be very general, are very confusing to the uninitiated, and that they demand special preparation by the student and require special skill and practice in the work of differentiation and classification before deductions can be made from them that will be of value. So it is with this subject. However confusing it may seem to be on account of the obscurity of the factors involved, we must not be discouraged. As it is a comparatively new science, we must begin at the beginning and first arrange our facts, and this will be a long and tedious process when we consider the field among both modern and ancient races. It is not a work to be accomplished in one lifetime, but will need to be passed on to another and perhaps to still another generation, but the results will well repay for the time and labor if we as a profession establish such an exact science.

Does Civilization Produce Variation? Chas. Tomes says: "There seems to be great variety of the teeth among all races of men, least among savages, most among civilized races. In the anthropoid apes there is greater constancy of the minute anatomical features, but even with them there is an occasional degeneracy of the teeth, showing a tendency to variation which in them has already resulted in the suppression of the third premolars (which are still present in the American monkeys) and of the third incisors and the fourth molars." So we have a general degradation of the teeth, and consequently increasing variation, which is augmented as we approach the higher races, but which originated away back in our simian ancestors. With them the features are very constant; with the lower

races of man there is some variation, and the tendency to variation increases as we approach the higher races in the scale of human evolution. Variation of the teeth is therefore due in a large degree to their degenerate condition in man, especially the higher races, for the features are more constant as we approach the lower stages of our phylogenetic history. We find this is the rule also with lower animals. Highly bred dogs have greater variation of the number and perfection of the teeth than their lower wild relatives, the wolf and the fox. With them the features are more constant, as the environments of life are more constant, than those of the highly bred, domesticated varieties.

The opinion is advanced by leading scientists that the human race, especially in its more civilized varieties, is undergoing a rapid evolution. The rapid changes of structure that the descendants of lower forms are undergoing to-day are reflected in the teeth. But as we go downward in the phylogenetic scale we find special features more persistent and hence of more distinctive value. Just as wild animals present fewer variations than their domesticated descendants, who have been surrounded by different conditions and environments, inducing new variations, so the savage man with more rigid and limited environments presents fewer variations in his structure as between individuals than his higher, more civilized brother, who has made new environments for himself with corresponding effects upon his structure. There are organic and physiological variations of structure, not including those due to pathological causes, that are directly due to influences which come under the general head of surroundings or environments. These lead to organic changes affecting the development of the individual, which, becoming permanent, form types. Some of these types perpetuate themselves, and by surviving come to have a specific value, for they distinguish distinct groups of individuals. When we come to know more of these variations and of the structural and functional variations that accompany them we shall be able to classify them so that they will have a diagnostic value. As regards the teeth these variations are yet unknown to a large extent and so are of course unclassified. Hence they cannot have a distinctive value or be diagnostic as regards races. Therefore it is our first duty to begin at the beginning and study and classify the variations of the teeth among all races. Our

suggestions at this time must be regarded as only general and preliminary to more detailed observations.

Modification of the Jaws. First as regards the jaws. As Prof. Geo. A. Dorsey says: "In the recent phylogenetic history of man's face each bone which enters into its formation has been greatly modified. This is especially true of the bones which comprise the jaws. As the forehead has become more and more prominent the prognathic character of the jaws has greatly diminished, and at the same time there has been a corresponding decrease in the total length of the hard palate. As the latter decreases in length one of two results follows: either the alveolar arch shortens, and thus there is a diminished extent of the dental arcade, or the alveolar arch remains of normal absolute length, and then there results a greatly increased breadth of the hard palate. Variations in the total length of the alveolar arch give rise to innumerable variations in the number and position of the teeth." The prominence of the lower face, the jaws—prognathism, as it is called—is a characteristic of the lower races of mankind, and they approach the anthropoid apes in this respect. In the higher races the jaws recede and diminish and the brain enlarges and advances the cranium over the jaws. This is orthognathism, or the vertical face—as characteristic of Europeans. As we descend the scale the jaws become more and more projecting and prognathous and the brain case recedes. Of course there are some exceptions, but the rule is of general application. Most savage tribes are prognathous, and the remains of fossil man are especially so. The jaws are heavier and stronger in lower races; the horizontal ramus is reduced; the palate and alveolar arch are lengthened so that the third molars are visible from the side, while in the higher races they are nearly concealed by the ascending ramus. There is also greater width and depth of the hard palate, as shown by Dr. Talbot's investigations, although there is great variation and uncertainty regarding this index.

The Chin. A conspicuous feature is the form of the chin. In the quadrumana the chin recedes rapidly backward from the alveolar border, the latter and the lower incisors being inclined forward. This is also marked in the remains of fossil man found in Europe, and is also prominent in the lower living races of mankind. As we rise in the scale the teeth become more perpendicular, the jaws

recede, and the chin advances until in the higher races it is quite prominent and full, as in Europeans. Going downward in the scale the chin recedes more and more until the type of fossil man is reached, which is of quite a simian form.

The Teeth. The teeth of man, as we know, are closely related in number, form and structure to the apes below him, and remotely to various members of the quadrumana. Indeed, like other organs, they bear in their structure the history of a long line of descent, and many of the indications of their origin can be read with some certainty. As Ward says: "As the heraldic divisions of a coat of arms convey to the practiced eye information concerning forgotten ancestors and their valiant deeds, so, too, is man's genealogy blazoned on his molars, where he who will may read." There is not so much of a gap between the lower races and the higher apes as between the lower and higher races of man. As the teeth of man are strong and well made they approach the simian form and integrity; as they are defective and ill-formed they depart from it. The structural integrity of the teeth is much more deficient and degraded in the higher than in the lower races. The teeth of man in general are degraded in form and structure and much reduced in specialization as compared with, for instance, the highly specialized teeth of the carnivora and herbivora. Some of man's teeth are quite primitive in type, as the quadritubercular molar, which is found far back in the Eocene, and occasionally this lapses into the still more primitime form of the tritubercular molar. The reversions to lower forms often presented are of peculiar interest, and exhibit their descent and relationship in a remarkable degree. The teeth of man being rudimentary as compared with the lower primates, these reversions are not unexpected. The distinguishing features of the anthropoid apes, and even of the monkeys and lemurs, we sometimes see repeated in man, thus a third incisor, a third bicuspid, and a fourth molar sometimes occur as reversions to lower forms in which these teeth are present. The upper bicuspids sometimes have three roots and the lower two, like the quadrumana. The second lower molar in lower races has the fifth tubercle, which is a simian feature. Other items of reversions to quadrumanous, or even insectivorous dental peculiarities, are not uncommon.

The incisors project forward and meet edge to edge in the apes,

and this is repeated in the low races; but as we ascend in the scale they become more vertical and the edges lap. The laterals are wider in the apes, but in man they become narrower so as to be quite in contrast to the width of the centrals. Cingules on the lingual face of the upper laterals are sometimes found in man, which is a reversion to the form found in the apes. The cuspids are large and carnivorous in the apes, but are much reduced in man and present some configurations, showing their descent and relationship. They present some ethnic peculiarities in the man as well. The bicuspids are smaller and generally have but one root in man, as compared with the apes, in which they have three roots above and two below, like the true molars. By reversion they occasionally have three roots in man and two below.

The true molars increase in size from first to third in the apes and also in some lower races. In the higher races of man they decrease in size from front to back. The cusp patterns of the human molars have been the subject of interest to many observers on account of their seeming to illuminate in some degree the problem of man's descent. It is with difficulty that the tubercles can be studied well in lower races, as they are usually much worn and abraded by the hard usage to which the teeth are put by all savage tribes, owing to the hard and gritty nature of the food employed and to their still using them as tools. Topinard found by investigating some 600 skulls of various races that the first upper molar was quadricuspid with the oblique ridge well marked in 99 per cent, so that the first molar is constant in all races. The second molar had four cusps in 66 per cent, three and one-half in 16 per cent and three in 16 per cent. It has four normal cusps in most lower races, as the Malays, Melanesians and Australians have it in about 80 per cent, while in Europeans it falls to 58 per cent. The third upper molars in all races have four cusps in 37 per cent, three and one-half in 11 per cent, three in 39 per cent, two in 5 per cent and irregular in 6 per cent. The first molar of all races has five cusps in 92 per cent, four and one-half in 4 per cent and four in 10 per cent, so that it, too, retains its type strongly. The second has five cusps in 24 per cent, four and one-half in 10 per cent and four in 64 per cent. It is usually quadritubercular in the higher races, but varies to the fifth tubercle in

low races, which is a simian feature. The third lower molar has five cusps in 66 per cent, four and one-half in 6 per cent and four in 31 per cent, but is very variable. Topinard concludes from his observations that the teeth of man are in process of transformation, the lower molars tending toward the quadricuspid type with a cruciform fissure and the uppers toward a tricuspid type. In the lower molars he thinks the fifth cusp tends toward the distal corner of the crown until it disappears, as the lower molars are becoming quadritubercular.

It is the disto-lingual cusp, or hypocone, that tends to disappear in the upper molars with the effect of producing the tritubercular molar. This is held by Cope to indicate that the upper molars of European races tend to revert to the trituberculate, lemurine type. Prof. Cope said in regard to this brilliant generalization, that "The quadritubercular type of the upper molars of man belongs to the primitive form from which all the upper molars of the placental mammals have been derived, and this has itself been derived from a still earlier tritubercular crown by the addition of a cusp at the posterior internal part. Considerable significance attaches to the question as to whether the superior molars of man are to be regarded as quadritubercular or tritubercular. The lower molars are also typically either quadritubercular or quinquitubercular, for in them the fifth tubercle is liable to great variation. In the nearest allies of man—the anthropoid apes—the superior true molars are all quadritubercular, although the hypocone, the disto-lingual tubercle of the third molar, is usually smaller in the chimpanzee. The lower molars are usually quinquitubercular in the apes, the gorilla not infrequently adding a sixth lobe on the external posterior margin of the crown. The molars in the monkeys are usually quadritubercular—without the fifth cusp in the lowers—except in some species, as the Pithecia and some others, where the superior molars are tritubercular. In the lemurs the third and second and sometimes the first upper molars are tritubercular in nearly all families, living and extinct. The tritubercular form is well marked in Anaptomorphus, that supposed ancestor of the primates from the Eocene of the West. So it will be seen that the reappearance of the trituberculate molar in man constitutes a reversion to the lemurs and not to the anthropoid apes or monkeys proper, and among lemurs the type to which it

reverts is that which presents the closest resemblance to a man in other parts of the dentition. The genus answering to this best is *Anaptomorphus.*" Prof. Cope examined many crania in the great museums and found the tritubercular upper molars in four out of twenty-five Slavs; seven out of twenty-three Greeks and Italians; six out of twenty-two Germans and Scandinavians; six out of eight French; twenty out of thirty Euro-Americans; nineteen out of twenty-eight Eskimos, etc. The tendency was therefore greatest in the French and Euro-Americans. The Eskimos are unique among savage tribes in the large proportion of suppressed or degenerate third molars which they exhibit.

The phylogeny of the human molar has been pretty thoroughly worked out. In tracing its evolution from the earliest form the various stages it has passed through are now well understood, and it may be mentioned in passing that these studies are well worth the exercise of our intellectual powers, since they throw light upon greater biological problems which bear upon the phylogeny of our species.

The third molar of man is not now considered to have much value as an ethnic feature, on account of its erratic forms. It is so erratic in all races as to present no special features that can be said to have any racial significance. It is irregular and uncertain as to number; it is more frequently suppressed in the higher than in the lower races; but it also presents nearly all the features of irregularity in lower races as to number, form and structure that are found in higher races. It begins, in fact, to decrease in form in the anthropoid apes, for the chimpanzee has third molars that are smaller than the other molars, and this tooth is missing entirely in the little marmoset monkeys of America. The fact seems to be that it is an organ that is in process of disappearance in the primates, and that it is most irregular in man and, most of all, in the higher races. There is no constancy in any race as to the ratio of its erratic habits. The nearer the apes in general structure a race may be, the larger and more functional and more constant in form and number the third molar seems to be, and the more animal-like. The higher the race, the more erratic and uncertain it is and the fewer simian features it presents. Its special anatomical features are so inconstant and unreliable as to supply no basis for generalizations. Its normal con-

dition seems to be that it should be abnormal as compared with the other molars. We must consider that it is an organ in process of suppression, and that it is in consequence subject to vagaries of form and structure due to the efforts of nature to abort it.

Teeth of Fossil Men. To go into detail briefly as to some of the features which characterize the teeth of different races, we will notice, first, the teeth of the most ancient examples of our race that have yet been discovered—the fossil men of Europe. Their remains have been found in well identified geological horizons, so that the authenticity is undoubted and their age immense. The latter is shown not only by the strata in which they were found, but by the degraded and animal features they exhibit, showing that they were indeed of the early varieties of our species, and that they had not yet been well differentiated from their simian ancestors. They possess the ape-like features of the teeth and jaws very strongly. The prominent superciliary ridges and glabella, the retreating forehead, the pronounced temporal ridges, the thick cranial walls, the massive zygomatic arches, the prognathous and massive jaws and mandible, the retreating chin, etc., are quite like the quadrumana. The large molars which increase in size from front to back, the large and functional upper third molars implanted by three distinct roots, the elongated lower molars, the fifth tubercle on all of the lower molars, the proportionately great size of the bicuspids, the heavy, long and ape-like cuspids, the centrals and laterals being of nearly the same width—a simian feature—all point to a low grade of development in the phylogenetic scale. Prof. Cope described these remains some years since. After dwelling upon the simian characters in the skeleton and denture exhibited in lower races he says, regarding the jaws and teeth of the fossil man: "What had been long suspected is now established, that there dwelt in Europe during Paleolithic times a race of men which possessed a greater number of simianoid characteristics than any which have been discovered elsewhere. The important discovery of the skeletons in the grotto of Spy, which were nearly complete, demonstrated that the men of Neanderthall, of Constadt, and Naulette, all belonged to the same race. The superciliary ridges were more prominent than in any living race, and other ape-like features were most remarkably shown. The retreating chin, like the apes, is most marked—there is really

no chin at all—like the quadrumana. The dentition shows that the molars increase posteriorly, to the same degree as they do in the apes. The upper molars are full quadritubercular, and the hypocone, the fourth cusp, is as large as the rest in all of the crowns. The third molars have three widely divergent roots, like the other molars. The bicuspids and cuspids are large, relatively to the true molars. The cuspid exceeds in size those of the Australians of to-day. The lower molars are prolonged antero-posteriorly, like those of the apes, especially the orang. The transverse diameter of the crown is also contracted in the posterior half, which is unlike any living human race and resembles the apes." Summarizing, he concludes that the man of Spy takes the lowest position among the known sub-species of man. The flints and implements found with the remains show that he belonged to the later Paleolithic period, but not to the still older. It will be interesting to discover the still older Paleolithic man.

Australoid Races. Among living races the Australian is the lowest and presents the most simian features. The Australoid races comprise the Australians, Tasmanians, the aboriginal tribes of India and Polynesia, and probably others. The stock is distinct and well marked, and its extent over the ancient world must have been wide. Among other low features there is excessive prognathism, inclination of the incisors, retraction of the chin, heavy jaws, etc. The skull is dolichocephalic, and the jaws are square and prominent, partaking of the general form of the head. The teeth are large, white, coarse and square, with the minute features well marked. The teeth are macrodont, according to Flower's index. The molars do not decrease from front to back, but tend to increase in size, the third being large and functional. It is often larger than the other molars and rarely deformed or missing. The hypocone is well marked in all the upper molars, there being no tendency to tritubercularism. The second lower molar has the fifth tubercle like the other lower molars, whose crowns tend to elongation. The cuspids are long and conical, an orang-like feature which is common to Australoid people. Supernumerary teeth, especially fourth molars, are found. In the New Caledonians and some other Australoid people the central incisors are so large and insectivora-like as to show their form through the lips. A few features, therefore, are distinctive of the Australoid type and have an ethnic value.

Negroid Races. The Negroid races include the Negroes of Africa, the Negrillos of Asia and Polynesia, and other black people not Australoids. They are dolichocephalic and usually prognathous, although some exceptions exist to the rule. Like the Australoids, the entire lower face is drawn forward by the prominence of the jaws, so that the third molars appear anterior to the ascending ramus of the lower jaw. The teeth are large, thick, dark colored, coarse and ape-like. The incisors project forward so that the edges meet at an angle. The chin retreats, but not so much as in the Australoids. The molars are large and wide, macrodont, and are of the same size, or increase from front to back. The third molars are large, have three distinct roots, and are full and functional. Rarely they are reduced in form or suppressed. The hypocone is present in the upper molars, and there is a tendency to the production of the fifth cusp, the hypoconule. This is sometimes found even on the third molars. Fourth molars are not uncommon. The cuspids are large and conical. The alveolar process is often thickened around the roots of the teeth to form prominent ridges just beyond the necks. The gums are dark or mottled, the pigmentation of the skin extending even to the mucous surfaces. These features are quite characteristic of the Negro.

Mongoloid Races. The Mongoloid race includes the Mongolians of Asia—the Chinese, Tartars, Turks, Siberians, Eskimos, Japanese, Malays, etc. Having a brachycephalic head, there is little real prognathism, though some prominence of the jaws. The incisors are inclined forward to some extent, yet there is a well developed chin, but not so full as in Europeans, as the incisors are not yet vertical. While most Mongols are brachycephalic, the Eskimos are a notable exception, who are dolichocephalic. The jaws are rounded in relation to the brachycephalic skull. The teeth are large, with heavy, prominent tubercles and cusps. The bicuspids are large as compared with the molars. Betty says the Japanese sometimes have many cusps on the molars, meaning probably that the hypoconule or fifth cusp or cingule is not uncommon on the upper molars. We are greatly in need of closer observation of the minute characters of the teeth of the Chinese and other Mongols. The Eskimos are dolichocephalic, but have round, rather small jaws and teeth. They are unique in having the third molars more irregular than most

savage tribes. The discoloration of the teeth among some Mongols by the use of the betel nut has prevented casual observation of their natural characteristics.

Americanoid Races. The Americanoid race includes the pre-Columbian people of North and South America, south of the Eskimo belt. There is much variation among the American Indians as to head and jaw forms. Some of the lower tribes are prognathous, and the higher and more advanced tribes are decidedly orthognathous, as much so as the Europeans. The teeth vary also and are classed as mesodonts, but they vary from macrodonts to microdonts in Flower's scale. The teeth are generally large, strong, and describe a wide arch. No special features have been recorded. The third molars, Betty shows, are as erratic as in other races. The mound builders had fine teeth, which when not much worn (as is very rare in their skulls) were large, yellow and coarsely made. The third molars were as large as the other molars. They were prognathous. Dental diseases and deformities were not uncommon among all American Indians, ancient and modern. Betty notes the lingual cingule as being present. The fifth cusp was variably present, especially in the mound builders and some ancient and low races.

European Races. Europeans are divided into two distinct types—the light race, the Xanthochroid, and the dark or Melanochroid. The European are microdont, orthognathous and mixed dolichocephalic and brachycephalic. The teeth are vertical, and both wide and narrow jaws are found. The Xanthochroids or light Europeans are dolichocephalic and usually have large, light-colored teeth, set in square jaws with prominent cuspids. They are more simian in type than the dark races. The third molars are more like the other molars; the hypocone is constant above; and the fifth tubercle on the second lower molar sometimes occurs; the fifth cusp or hypoconule occurs frequently on the upper first molar, and cingules on the laterals are common. The dark peoples, the Melanochroids, are of smaller stature, brachycephalic, small round jaw, small teeth, the incisors and cuspids much reduced; the tritubercular upper molar is common; the third molar is often suppressed and usually degenerate in form, and the simian features absent in general. In fact, the Melanochroid type in Europe is the farthest from the apes and is the

most degenerate. On some important branches of the Melanochroid type, as the Egyptians, Semites and Hindoos, we lack data from careful observation. With the ancient Egyptians, as of many ancient peoples and savages, the teeth are usually so much worn as to obliterate most of the minute features.

These few details show only what we could wish to accomplish in the way of isolating and differentiating minute anatomical features with a view of classifying them in relation to their ethnic significance. As other parts and organs of the human body have been so classified, it is not too much to ask that as much should be done for the teeth. So we return to our first proposition, that it is a scientific work that should be undertaken by the dental profession, whose members are equipped in a peculiar manner for it.—*Items.*

NASAL OCCLUSION AND SEPTAL DEVIATION IN THEIR RELATION TO ANTRAL DEVELOPMENT AND FACIAL EXPRESSION. By Royal S. Copeland, A. M., M. D., Ann Arbor, Mich. Read before the American Society of Orthodontists, October, 1902. *Orthodontia and Rhinology.*—It is difficult for one whose thoughts are usually turned in other directions, and who has personal acquaintance with very few of your profession, to know how fully you appreciate the relation between your specialty and that of the rhinologist and laryngologist. The intimate relationship and the interdependence of the specialties are the two things which makes me tug at the halter of a fixed title. This intimacy is not alone a matter of neighborhood relation, but dates back to a common embryological development. It will be remembered that the naso-frontal process, which enters into the formation of the intermaxillary portion of the upper jaw, has also an important part in the formation of the septum and the bridge of the nose. The palatine plates, too, in that they form the roof of the mouth and the floor of the nasal fossæ, are common to your specialty and mine. Furthermore, certain morbid conditions of the nose and throat produce evil results in dental development, and some forms of heterodontia (malposition of teeth) are responsible for deviations from the normal in the organs looked after by the rhinologist and laryngologist.

Etiology of Malformation.—One cannot make a critical study of

deviation of the nasal septum and malocclusion of the teeth without being struck by the remarkable parallelism of the two conditions. Both appear at the same age, they are frequently found in the same patient, and have much in common etiologically. Placing all the deformities of the nose and mouth into one class, and considering them as different expressions of a single condition, it is interesting to theorize a bit as to the causative factors responsible for these unsightly deviations from the normal facial lines. Every such case, of course, arises from causes congenital or acquired. Of all the cases those due directly to congenital causes are the least common, but to make a proper classification it is necessary to include in the congenital forms certain cases which are due to nasal or postnasal diseases, themselves the natural result of congenital causes. In this I refer particularly to such cases of septal deviation or malocclusion of the teeth as accompany adenoids or tonsillar hypertrophy. This question will be dealt with more at length in another place.

Embryological Origin of Facial Deformities.—The embryological origin of many of these deformities has been overlooked by most writers. The reason for this is quite apparent. Most congenital defects of the head, for instance coloboma of the iris, hare-lip and cleft palate, are expressions of arrested development which are apparent at birth. Other abnormalities recognized as congenital in origin appear very soon after birth. Septal deviation and the various deformities grouped under the general term of heterodontia do not become apparent in most instances until the seventh or eighth year. Naturally, therefore, the possibility of congenital origin is overlooked and a less remote cause is sought.

Some Embryological Facts.—Before considering this theory it is well to recall some embryological facts. Embryology, as you know, is a science which is yet in the stage of development. Fortunately for us the parts of the head in which we are interested at this moment are among the settled portions of the science. I agree with my friend, E. D. Reed, who includes in the science of embryology not only the changes which are completed in utero, but also the processes which begin at that time, even though they are continued through infancy to early adult life. The foundation of Danziger's theory is one of the processes normally incomplete at birth, but asso-

ciated with changes strictly embryonic. It will be recalled that at the base of the skull the embryonic head has eight separate and distinct bones. These fuse during early life and the total number is divided by two. The thing of special interest to us is the fusing of the baso-occipital and the sphenoid. Normally this takes place in early adult life, actually it undoubtedly occurs much earlier in many people.

Congenital Malformation.—Too early fusion at this point impairs the growth and development of the base of the skull. It shortens the space between the foramen magnum and the base of the nose, at the same time impeding the growth of the maxillary bone. Danziger contends that in consequence of these phenomena the palate is pressed upon from all sides, with the result of a high, pointed palatine vault. This in turn encroaches upon and narrows the nose and nasal pharynx. Granted that this is true, and it looks reasonable, the deflected nasal septum is the result of causes which may be traced directly to an embryological source. The shortening of the baso-cranium may be a cause too for a deficiency in the growth of the orbit, with consequent involvment of the eye. It throws light on deafness. A disturbance of the aural cavity, with an interference in the growth of the tympanum, causes such impairment in shape and function as is found in deaf-mutism. Danziger's theory is attractive and it appeals to me as worthy of tentative acceptance. It explains why a face, which in infancy and early childhood is symmetrical and attractive, becomes massive in its upper half and diminutive in its lower half where its growth is impaired by accident of development. It does not explain all of the cases of septal deviation or dental malposition, and it does not account for the majority of them perhaps, but it does explain the cases of heterodontia occurring in children free from nasal and throat diseases, children who have been well and healthy from the time of birth.

Acquired Malformation.—There are cases of malocclusion and septal deviation which cannot be explained on this hypothesis and yet, as I have said, they might with all propriety be classified as congenital. I refer to the deformities resulting from nasal, post-nasal or pharyngeal disease, which in itself is congenital in origin. The immediate cause, however, for the facial deformity in such

patients is exactly the same as would produce such a deformity after traumatism or acute disease. To be more explicit, it makes no difference whether the nasal occlusion, for instance, be due to adenoids or to cicatricial contraction following a burn. Therefore, I will consider the remaining possible etiological factors in facial deformity under the head of acquired causes.

Mouth-Breathing.—No matter what may produce the nasal occlusion, it is chiefly the mouth-breathing which has to do with the change in the facial expression. Reference to your authors shows this to be a threadbare subject. You have already discussed, pro and con, the action of the buccinator. I have fancied the human anatomy has been somewhat amplified and embellished by a few of your writers in an attempt apparently to force a conclusion not altogether justified by the ordinary dissections. But it is undoubtedly true that the hanging lower jaw, and the action of the facial muscles upon the plastic alveolar process, have much to do with the development of the heterodontia.

Psychic Phenomena.—Many children have habitual facial expression as a physical manifestation of certain psychical influences. It has been noticed for years that diseases attacking certain regions of the body manifest themselves by certain lines or furrows in the face. In abdominal disease, as for instance gastro-enteritis or even chronic gastric irritation, there is found a distinct furrow beginning at the ala of the nose, passing downward and curling around the corner of the mouth. In disease of the lungs or air passages there is a line from the angle of the mouth, running outward to be lost in the lower part of the face. These lines are the result of unusual muscular force habitually acting in one direction. The symptom of pain felt by the little patient is manifested in this way. It is conceivable that mental conditions from other causes may result in fixed expressions. The distribution of force by the action of the muscles in the happy, changing moods of the child and the placid expression in sleep are lost. The unequal distribution of muscular effort probably has its effect upon the alveolar process. Therefore, psychical influences must be counted as one of the possible factors in the production of heterodontia.

Septal Deviation Not Due to Acquired Causes.—It is important to know whether or not the bone itself is influenced by the move-

ment of the teeth. If it is, Dawbarn's theory is worthy of consideration. He says the pull on the adherent faucial pillars, in enlarged tonsils for instance, influences the dental arch, while the disuse of the nasal passages in mouth-breathing produces negative pressure there. Acting together these forces would cause the vault of the mouth to rise and tend to point the dental arch. Septal deviation and malocclusion would result. The fact is, however, that careful measurements of Dr. M. T. Watson's models show that in the reverse process, i. e., in the correction of the deformity, the roof of the mouth is unchanged in position. These models, showing as they do most wonderful changes in the breadth of the dental arch, reveal no change in the height of the vault. In the light of my present experience and observation I believe that wonderful plastic, supporting tissue, the alveolar process, is alone affected by the pressure, be it accidental from muscular action or intentional from the appliances of your specialty. Septal deviation then is not to be expected as a result of malocclusion from most acquired causes.

Other Causes.—Did time permit it would be interesting to consider the possible relation of failure of local nutrition to the malformations under discussion. Some other writer may touch upon the differences in structure, origin and development between the maxillary bone, cartilaginous originally but ossified in embryo, and the alveolar process, membranous, really sesamoid in nature, not permanent, serving its day and generation and disappearing. The influence of some underlying dyscrasia or diathesis is another point worthy of thought. I am content, however, to leave the subject here and let another finish the incompleted work.

The Maxillary Sinus.—There is one other topic to which attention should be directed for a moment or two. The title assigned me gives license to consider at some length the relation of the antrum to facial expression. The development and growth of that sinus, however, has so little to do with the change in facial lines, that trespass upon your time for that discussion would be unwarranted. The popular idea is so counter to this statement that it may be wise to say a word or two in defense of the proposition. Between the middle and inferior ridges, which later become the turbinated bodies, about the tenth week of embryonic life there occurs an evagination of the ectoderm into the maxillary process.

The result is the formation of the maxillary sinus. This change is a peculiar one. It is an actual hollowing out and destruction by ectodermic tissue of an otherwise solid bone. We can think of it as a sort of normal or physiological malignancy. The process is not complete until early adult life, but the peculiar way in which the antrum develops explains why there is no change in the external face. It is not a swelling or inflation of the maxillary bone, but a resorption of its interior. Under normal conditions we need therefore expect no change in the facial lines by reason of antral development.

Relation of the Antrum to Malformations.—Unfortunately, the maxillary sinus is not always normal in development or condition. In fact, it is more commonly diseased than the most careful writers of a few years ago supposed. Your own Professor Cryer and doubtless others of your profession have called special attention to the importance of observing the state of the nasal accessory sinuses. It has remained for Grünwald, Herbert Tilley, and one or two other investigators to determine the far-reaching evils attending nasal sinusitis. In chronic empyema of the antrum that sinus becomes a reservoir of pus which overflows into the nose, passes into the throat and is swallowed. Septic conditions affecting the entire system are sure to follow. This result is to be expected, but there is another effect of sinus involvment which until lately has been almost entirely overlooked. I refer to nasal polypi. In practically every case where they exist the primary disease is located in one or more of the sinuses.

In summing up the relation of antral involvment to heterodontia, let me call your attention to a kind of "house that Jack built" sequence: Diseases of the antrum may result in nasal occlusion, nasal occlusion is attended by mouth-breathing, mouth-breathing may be followed by displacement of the teeth. To use another figure, this sequence may be looked upon as a "Round-robin." It begins with a diseased tooth causing antral disease and ends with the orthodontist treating an effect directly traceable to a dental cause.—*Items.*

DEVELOPMENT OF THE DENTAL FOLLICLE. By Dr. W. W. Mungen, Fort Wayne, Ind. Read before the Indiana State Dental Association, June, 1902. The object of this paper is not

an attempt to disclose any discoveries made by myself, but simply to state my understanding of the development of the dental follicle, from conclusions drawn from different writers on the subject.

Dr. Chapin A. Harris in 1858 said: "Of all the operations of the animal economy, none is more curious or interesting than that which is concerned in the production of the teeth. In obedience to certain developmental laws established by an all-wise Creator, it is carried on from about the sixth week of fetal life with the nicest and most wonderful regularity until completed, but so secretly conducted as to prevent the closest scrutiny from detecting with precision the manner in which it is effected; enough, however, is ascertained from its progressive results to excite in the mind of the physiologist the highest admiration."

I heartily agree with the doctor as to the curious and interesting phases of the development of the teeth. There is no part of the study of dentistry quite as interesting to me as the development of the dental follicle, but comparatively few dentists take much interest in this branch of study. To my mind this process is the most intricate and unique of the human anatomy, barring possibly the force controlling the heart's action and the formation of the fetus itself. It may be interesting to know that very little was understood of the formation of the dental follicle until and during Dr. Harris' time. It seems that the investigators did not begin observation early enough in fetal life to determine the true starting point of the tooth until Dr. Goodsir traced the growing process of the teeth from germs, as he called them. Suffice it to say that it remained for two Frenchmen, Magitot and Legro, about the year 1860, to correct theories in regard to the development of the dental follicle. There have been other works published on this subject since they published the results of their labor, but the differences of opinion are so slight that I think I am safe in taking for my authority the above-named Frenchmen.

The face of the fetus at seven or eight weeks is merely an irregular opening, but at the fifth week the burgeons of the inter-maxilla and maxillary bones make their appearance and join together about the forty-fifth day. At nearly the same time the epithelial or dental ridge makes its appearance. The teeth, as we all know, are developed in the mucous membrane, which consists of three coats.

The basement membrane occupies the middle, while the part beneath is called the dermis and the part above is called the epidermis. The basement membrane is structureless, and the epidermis, which is of most interest to us, consists of five layers of cells—the corneous or dead cells, the biscuit, polygonal, Heckel and columnar cells. All between the basement membrane and the corneous layer of cells is called the Malpighian strata, and in this strata of the mucous membrane is the beginning of the tooth.

In the lower jaw just beneath the epithelial ridge or tooth-band, as it is termed by some writers, is found Heckel's cartilage, which later develops into the jaw bone proper. Some authorities, however, believe that the cartilage disappears by absorption. The epithelial ridge is formed about the seventh week by an extraordinary development of the polygonal cells, while at the same time the columnar cells slip down or are depressed, forming the epithelial band. This gradually deepens, being followed by the prominence of the ridge, until a fold is assumed and the ridge falls in, forming a depression called the primitive groove. The fold extends out and forms the epithelial lamina. Later ten little pimples make their appearance on the extremity of the lamina. These pimples are called papillæ and correspond to the ten temporary teeth. The papillæ are the germs of the enamel organs of these teeth. The papillæ grow larger, assuming a bottle shape, and keep descending until the bottom begins to be depressed toward the center, which results in a concavity in its lower extremity.

The growth of the papillæ has been divided into four stages: First, the papillary stage; second, the bottle; third, the decanter; fourth, the decanter with a concave bottom. During the four stages of growth the papillæ are still connected with the epithelial lamina by a cord called the epithelial cord. This is afterwards broken up and dissipated. The basement membrane follows all the convolutions of the columnar epithelium, which envelops the enamel organ in all its stages.

The derma pushes itself up into the concavity in the bottom of the enamel organ and becomes the dentin organ or papilla. The reciprocal adaptation of the two organs, which takes place from the first appearance of the dental papillæ, continues throughout all their subsequent phases, the enamel organ always covering the dentin

organ and exactly fitting its contours, whatever may be the shape. No connection of tissue, however, exists between the two organs at any stage of development. The dentin organ simply pushes its way up into the enamel organ, assuming the shape of the tooth which is to follow.

At this point the papillæ do not extend to the ends of the jaw, but leave a space where, after the formation of the enamel organs of the temporary teeth, two other papillæ appear, one on either side, for the development of the first molars. These papillæ make their appearance about the sixteenth week. After the dentin papilla has assumed the form of the tooth it is called the dentin organ. About this time the epithelial cord begins to break or disintegrate and the enamel organ becomes a closed sac. The space inside the sac is called the reticulum and is filled with stellated bodies. These bodies are differentiated polygonal cells, being nucleated and having from one to three nuclei. Dr. Sudduth says the stellated reticulum also contains enamel salts and is the storehouse of all enamel growth. The outer wall of the enamel organ or follicle is tough and is composed of aveolar fibrous tissue. The inner or papillary layer lies between the outer wall and the enamel organ proper, is of a grayish color, and a jelly-like consistency.

About this time a little cap of dentin makes its appearance at the top of the dentin organ. It constantly develops downward and inward, forming the shape of the tooth. The enamel immediately begins to develop outward from the same point. Before the appearance of the dentin cap small bodies, called odontoblasts, are seen on the surface of the dentin papilla. These are the organs that develop the dentin. They give off hair-like processes from the upper surface called the "soft fibers of Tomes," around which the dentin is found, thus leaving a circular canal, which later becomes the dental tubuli. We must remember that the dentin formation, or ossification, does not overtake the odontoblasts toward the center until the dentin has become the desired thickness, the tubes lengthening out as the odontoblasts recede, and then they form the pulp of the tooth. As they recede they merge together, as they cannot all be accommodated singly in the pulp cavity. The first function of the "soft fibers of Tomes" is to form a tube, being used as a mandril around which the dentin is formed.

As I have already said, the polygonal cells, above the basement membrane, become the stellated bodies, and the columnar cells now become the ameloblasts (enamel blasts), which are the organs that develop enamel. They are regular hexagonal prisms and remain so after they are formed into enamel. The layer of membrane surrounding an enamel rod is called the enamel reticulum.

The epithelial cord has several buds formed around it, and about the time of the closing of the sac, or just before the dissipation of the cord itself, a bud is thrown off from the lower end of the cord, forming the burgeon of the succeeding permanent tooth. The burgeons of the anterior ten teeth only are formed this way. The burgeons for the permanent teeth are identical with those of the temporary teeth; that is, they are composed of columnar epithelium, covered with basement cells and enclosing polygonal cells, which later become stellated bodies. The parent cord is severed from the deciduous tooth and broken up, and the pieces are found floating around in the embryonal tissue. Sometimes a bud or burgeon will become detached from the cord, and floating off into the tissue will form a supernumerary tooth.

The basement membrane between the enamel and dentin organ becomes calcified and forms an animal or bony cement between the enamel and dentin. The enamel grows outward and the dental follicle contracts, and the stellated bodies and liquid albumen are forced down around and take the form of the tooth. If there is any excess of tissue above what is needed it is resorbed. The outer tunic lies immediately on the enamel. The basement membrane now forms the enamel cuticle, which soon wears off. The development of the aveolar process begins in the outer wall of the dental follicle, which is made up of alveolar fibrous tissue.

The inner or papillary wall of the follicle takes on vascularity by the slightest pressure, and as the crown is pushed up by the root developing downward, it naturally causes extra pressure on this vascular wall, which finally leaves the side of the enamel organ and becomes a vascular cushion over the crown, which has the property of resorbing any substance excepting enamel. It is now known as the organ of resorption and is the pioneer in the process of eruption, leading the way by absorbing the alveolus, gum tissue, roots of deciduous teeth, and such substances as may bar the way,

leaving a clear path for the tooth beneath. It secretes liquor sanguinis, which it throws off in great quantities, and dissolves all tissues that stand in the way of the tooth.

The basement membrane is developed downward along with the lengthening of the root, the dentin forming on the inside and the cementum on the outside of it. There are three stages in the development of cementum. The primary cementum is the first lamina formed, and its function is purely a physiological one—to establish vital relations between the finest and densest tissues of the body, the dentin and the alveolus, acting as an intermediate tissue. After the first lamina of cementum is formed the secondary commences to form and is added on layer by layer. Its function is purely a mechanical one, to lift the tooth into occlusion, and laminæ are added until perfect occlusion is secured, besides rounding off the ends of the roots so that they may bear the force of mastication without occasioning pain or soreness. It also acts as an intermediate tissue between the dentin and the pericementum, but this would be established by the primary cementum without the aid of the secondary. There is persistent blastema beneath the pericementum which will develop cementum whenever the conditions will admit of it; that is, when the pressure of the pericementum is relieved it will develop and force the tooth down from the socket. This is the third stage and is called exostosis or exostocementum. Each lamina of cementum contains numerous lacunæ or lakes, connected with canaliculi, which also connect with the tubuli of the dentin.

The functions of the syrupy filaments in the dentin are, first, to act as a mandril around which the dentin is built; second, to obtain a normal equilibrium of the dentin; third, to act as nerves and vessels by transferring sensation and moisture. The cementum passes under the enamel following the basement membrane.

In 1858 Magitot claimed to have found within the dental follicle of a developing tooth a special organ for the development of the cementum. With the exception of this author, no one has recognized the presence of this special organ. The second molar obtains its cord from the cord of the first molar, just above the sac. The third molar from the second, but occasionally from the gum in the neighborhood of the first molar. If the cord is formed from

the cord of the second molar it will be of the same type, but if derived from the gum it may be of any type. That is, it may have a single root and cusp or several.

Discussion.—Dr. Geo. E. Hunt: The essayist speaks of the separate parts of mucous membrane being known as the basement membrane, dermis and epidermis. Those terms are applicable to the skin and its underlying tissue, but recent histologists have discarded them when speaking of mucous membrane and have divided it into the epithelial layer, composed of thick, stratified columnar cells, corresponding to the epiderm; the tunica propuia, a rather dense network of interlacing connective tissue, fibers and some yellow elastic, in which layer the various papillæ have their origin, and which corresponds to the dermis; and the submucosa, in which mucous glands are located, consisting of loose-textured connective tissue, fibers and some muscular and fat tissue, corresponding to basement membrane. The enamel organ is formed from the outer or epithelial layer in the way described by the essayist. He mentions the four stages as the papillary, bottle, decanter, and decanter with concave bottom. That shows the trend of the Fort Wayne mind. In Indianapolis we speak of the organ as bell-shaped. The essayist does not tell us from where the papillæ for the permanent first molars come. It is a question of dispute. They may come from the papillæ, forming in tooth band as the deciduous papillæ do, and extending back, or form an independent cord, as do the second and third molars.—*Review.*

ODONTOCELE. By Henry C. Boenning, M. D., Philadelphia. (Remarks at Surgical Clinic.) From various accounts in books and journals odontocele is held by the profession to be a rare condition, but the cases that have been presented at these clinics establish the fact that it is by no means rare. In order to avoid any confusion, let it be clearly understood what is meant by odontocele. Some regard it as simply a swelling due to an unerupted tooth. By an odontocele we mean a tumor containing tooth substance; either in the form of a fully developed tooth, or a conglomerate mass of tooth-bone and enamel of irregular shape, entirely encapsuled within a cyst, which may be made of soft or osseous tissue.

A cyst containing a tooth or tooth substance may develop, irrespective of the eruption of the proper number of teeth, from what might be termed adventitious dentinal germs. Thus, in a case which was operated on at this clinic there was a full denture, excepting the third molars. A tumor was found just above the incisors on the left side of the upper jaw. The statement was made that the growth was not noticed until the girl was about fourteen years of age, after which time it grew rapidly, relatively speaking, until by the time she was sixteen years of age, there was a tumor the size of a large nut completely occluding the left nostril. This was opened, and a mass of tooth-substance removed. Now, after nearly a year, on careful examination of the case a slight elevation or swelling, sensitive to the touch, is found just anterior to the malar process of the superior maxilla. The first and second molars are *in situ* in the alveolar arch.

The first tumor operated on was hard to the touch, round and painless—except for a sense of slight aching at night. By its position it interfered with proper respiration through the left nostril, and also caused some deformity, best seen in profile. Despite the presence of the full denture the diagnosis of odontocele was made, and the case was operated on here at the clinic. After raising the periosteal flap over the tumor, a thin layer of bone was cut through by the bur, which caused some laceration of a lining capsule, and afforded the escape of some contained fluid. A probe was introduced into the cyst and detected hard, dense material. After enlarging the osseous cyst, a pair of strong universal alveolar forceps of extra weight were applied, and with a little effort the contents of the osseous cyst were removed. It consisted of a mulberry-shaped mass, with two divergent processes, one extending directly backwards into the anterior portion of the palatine process of the superior maxilla, the other process presenting outwards and upwards, but much shorter. On examination of this mass, it appeared to be composed of numerous tooth-germs of a distorted and irregular shape, insomuch that there were irregular admixtures of enamel and dentin and ossific deposits. Since the operation the patient has been kept under observation; and it is now found, as before stated, that the swelling above the molar teeth is increasing in size, and unlike what generally occurs, it

is quite tender to the touch. This tumor I consider to be another developing odontocele, and will be operated on in the near future.

Today we have another case, that of a young man who has a tumor presenting on the anterior portion of the superior maxilla, slightly beyond the reflection of the mucous membrane from the cheek to the gum structures. The history points to the fact that he had a tooth extracted when quite young; but I see that there are two teeth missing. The symptom that drew his attention to the condition of his jaw was pain radiating from the superior maxilla, and some irritation of the Schneiderian mucous membrane. He states that the condition here mentioned was not noticed until about four years ago, and since that time the sense of annoyance has become more and more established. In this case I have no hesitation in assuming the existence of odontocele; but the position of the present tumor, as well as the presence of rhinitis, indicate to my mind some involvment of the antrum. We will operate on the patient today.

Patient was operated on by removing the tissues over the mass. The thin shell of bone was divided, and what appeared to be a mass of enamel was brought to view. A pair of forceps was carefully applied, but it was found necessary to enlarge the opening through the bone before the contents of the tumor could be removed. When this was done it was found that the antrum had been opened. The application of the forceps then extracted a normal-sized, fully formed, right cuspid, lying horizontally with its crown pointing backwards towards the region of the first molar. The apex of the root was slightly curved upwards towards the floor of the antrum. Upon using a probe it was found that there was a cyst corresponding to the root of the tooth placed horizontally across the antrum, the apex resting against the wall of the nasal meatus. As this osseous cyst was found to open into the antrum, the cyst walls were cut away and the antrum opened sufficiently to admit the end of the finger, the case being thus simplified for after-treatment.

It has been our fortune to see some obscure cases of tumors of the maxilla in which the diagnosis was not established prior to the operation; in several of them odontocele was present. In all such cases the contents of the odontocele consisted of an irreg-

ular mass of enamel, bone and dentin, and in two of such cases at least (not including the one first mentioned at this clinic), the full number of teeth were erupted and found in position. I mention this particularly, so that the *one imperative* diagnostic sign, according to many authors, namely, the absence of a tooth in the denture, loses much of its force and importance as a diagnostic sign. Just as there are germs for the normal complement of teeth, so there may be supernumerary germs; and while these may develop at periods consistent with the eruption of teeth in the vicinity, their development sometimes takes place at a very much later and irregular period. The favorite time for their development is at or shortly after puberty. Furthermore, as supernumerary teeth are not infrequent, we can more readily understand the excessive development of tooth germs in and about the alveolar process.

A case of much interest in this connection was an operation for the removal of a tumor within the nasal cavity which entirely occluded it. After exposure of the cavity by removing all the anterior portion of the superior maxilla by a V-shaped incision, and turning it back with the soft structures attached, the tumor presenting within the antrum was opened, and a great mass of tooth bone and enamel, with a quantity of loose ossific matter in the form of splinter-like pieces of bone, was removed. This case would probably, however, be better classed among the dermoids.—*Stomatologist.*

OUR SAYINGS. By C. A. Brackett, D.M.D., Newport, R. I. "Out of the fulness of the heart the mouth speaketh," and speech constitutes so large a part of all communication between human beings that our sayings are of great consequence. What people say to us interests us, amuses us, instructs us, raises our spirits, stimulates our ambition, rouses our courage, moderates our enthusiasm, excites our anger, inspires and cultivates friendship, makes us miserable or fills us with happiness. What people say of us makes or mars that good name which is rather to be chosen than great riches.

The sayings of every person, from the youngest child whose prattlings give joy to the mother's heart, up through all the gradations of years and experience and through all the affairs and relations of life, are of consequence. Of special importance are the

expressions of those to whom others go for any sort of advice or help in any of their concerns. Within this category stands the dentist, and we should always seek to have our expressions to our patients governed by a wise discretion. Those who come to us should always be able to see in us cheerfulness and cheeriness, frankness, sincerity, uprightness, and the desire to serve. Both self-respect and modesty should be apparent. Compliance and firmness have each their place. We should be chary of promises, and yet be possessed of that self-confidence which knows what it can do. Beyond saying hopefully that we will try, there should seldom be advance assurance of what we will do. Let the thing done be the declaration. When we are in fault, as every one must sometimes be, a readiness to acknowledge it and take our share of blame is always the best way out. We would better have our ability questioned than our honesty. Never tell any one that an operation will not hurt when you have reason to believe that it will. Never deceive a child, nor permit any one, parent or otherwise, who accompanies it to make untrue statements to it while it sits in your chair. Distrust in a child from former experience is a most pitiful thing to see, while one cannot fail to have great gratification in the submission and cooperation under painful procedures of a good child who has always found that it could rely implicitly upon what it was told.

Few patients come to our chairs without some feelings of trepidation. Often there is reason for dreading our inflictions; but there are many instances in which the apprehension is not well founded. Either the operations will not hurt, or they may be so palliated that they will be quite bearable. Remembering the shrinking which we, ourselves, have from being hurt, we should strive both to make our inflictions upon others as light as thoroughness of work will permit, and to do all that we can to set aside needless apprehension. Before we begin the work and during its progress we may do and say much to disarm apprehension, and to cheer and encourage against timorousness. And we should not only say things, but in our tone and manner we should make it apparent beyond question to the patient that we sincerely sympathize, and that we are not inflicting and will not inflict any hurts that we can reasonably avoid.

The dentist especially needs self-control. He needs it for his own sake in order that he may maintain his mental balance and work to

the best advantage, and he needs it again because often his control must supply the place of the patient's self-control. Real self-control is of course largely a matter of temperament, but it is also largely a matter of cultivation. Numbers of people remarkable for their equanimity and mildness of expression were by nature very different, and have attained their graces through persistent effort. It is a great help under exasperating circumstances to cultivate the habit of hesitancy of speech, and of speaking in a tone lower, or at least not higher, than usual. One should seek to frame one's sentences so that it cannot be charged by the other party that they contain untruth, inaccuracy, exaggeration, or misrepresentation. It is good practice in self-control never to use exclamations or expletives under any circumstances. Mishaps, accidents, surprises, failures, alarms, shocks, of little or of much consequence, come to us. Under such circumstances many people make exclamatory expressions practically involuntarily. It is with them simply a habit. With a little attention and effort one may form the infinitely better and, for the dentist, far more becoming habit of being silent, whatever happens, until a rational sentence can be formulated.

The dentist should be very careful in all his expressions concerning others. Never let it be said that your office is a good place to get the news. Seldom introduce a personal topic of conversation, and then only to commend something which is good and worthy. Ascribe to others good intent and right motives; make allowances for mistakes, misunderstandings, and misapprehensions. Do not mind trifles. Cultivate a broad-mindedness and a high-mindedness. With the right spirit in us we shall find but most rarely in the work of any other practitioner anything to condemn or even to pass over in silence; but we shall find all along the way multitudes of instances for commendation.

Do not talk too much. In a particular community a lady of wealth and prominence entered a store. A salesman, who knew her face but was utterly unknown to her, came forward and greeted her effusively. "Good morning, Mrs. So-and-So. It's a fine morning this morning. I was pleased to see you at the opera last evening." The lady put on her eye-glasses, looked him up and down, and said, "Young man, I came here to buy a carpet." Some of our patients come to us to have a tooth filled. Undivided diligence in filling the

tooth is what is desired. Above all, do not burden others with any of your own cares or trials. Before you say anything question if saying it will serve any good and useful purpose or make anybody really wiser, better, or happier. No one is benefited by having you retail that you did not sleep last night, or that mosquitoes have bitten you, or that you have dyspepsia, or that the cook has left and the plumber did not come. First, do not have troubles; second, when you have troubles, do not mind them; third, when you mind them, do not talk about them.

Do not talk too little. We all of us have many patients whose satisfaction in their calls upon us is much helped by our cheery sociability, many of whom we can interest and advise, encourage and comfort. I have just intimated that we should not ordinarily make our own cares subjects of conversation. With equal earnestness I would say that we should be ever ready to listen to the troubles of others, and alert to be as helpful as we can to every one who is really in need of such cheer and comfort as we can give.

A lamentable case of inconsiderate cruelty of expression was under these circumstances. A skilled and careful dental practitioner had been nursing along for some time a case of disease in the mouth which he recognized as malignant. The patient was very ill, but neither he nor any of his friends had knowledge of the grave significance of his malady. If I remember rightly, the patient's wife was of an hysterical temperament and a victim of heart disease, which made anything of a mental shock a great risk for her. One day when the patient and his wife were in the office, the attending practitioner had a call from another dentist whom he politely asked to see the case. At the first glance the visitor blurted out, in a voice to be heard through consulting and waiting rooms, "Well, I don't know what you think about it, but I think that is a cancer." The drop had fallen and the harm done by the inconsiderate expression could never be repaired.

To offset this I may give you some more kindly instances. A gentleman, now past eighty years of age, has for a long time at annual examinations pointed out a buccal filling in a right lower second molar as having been made when he was twenty-six. Really his present dentist refilled the cavity a dozen years ago, but he is quite content that the old-time service should have the credit.

Nothing in the way of faith could be more implicit than one elderly lady's confidence in mutton tallow as a panacea for every sort of a toothache. In her case the most intense odontalgia yields at once to a free inunction upon the gum. Some of her friends have hard work to accept and use her remedy, but her dental adviser expresses only rejoicing that she has such a ready and effective resource.

In the beginning of my practice an estimable old lady, long since of blessed memory, came in wearing a partial lower plate with two ordinary porcelain central incisors attached. She told me of her long-cherished and deep-seated repugnance to wearing artificial teeth, and of how, when her own teeth had dropped out, her dentist had mounted them on the plate, and she had such satisfaction in wearing them. He would have been a black-hearted wretch who could have destroyed the sweet illusion. You will note that the writer draws a line of distinction between wilfully deceiving, and permitting others to hold opinions to which they are entitled. In our interviews with our patients, then, discretion, tact, honesty of purpose, and kindness of heart should govern our sayings.—*International.*

CHARACTERS OF HUMAN STRUCTURES. By C. N. Peirce, D.D.S., Philadelphia. Read before the Pennsylvania Association of Dental Surgeons, Dec. 9, 1902. Contrasting man with other vertebrate creatures, the most conspicuous thing noticeable is his capacity for assuming an erect attitude. In this position the head is balanced on the summit of the spine, the lower limbs are two projections from the trunk, columns for the support of the body on two feet, also for the purpose of walking while the body is perpendicular to the surface on which it stands. Man's mode of progression, from having his two feet, may be termed bipedal. The arms, projecting from the upper part of the body, relieved from the duty of locomotion acquire great freedom and range of movement from the shoulder joint, also a movement at the elbow and between the two bones of the forearm not much inferior to that at the shoulder. On the extremities of these are the hands, which are modified to serve as organs of prehension and to contribute to and serve the purpose of his more developed intelligence.

This erect attitude which is assumed by man is in striking contrast to the horizontal one in which reptiles, amphibia, and fish in-

dulge, whether they be at rest or moving. Birds, although far removed from the erect attitude, show a nearer approximation to it than the more primitive vertebrates or even the quadruped mammals. Of all the vertebrates which most nearly approximate man in his position assumed in standing or walking the higher apes come first.

The various adaptations of structure in the body, limbs, head, and brain which conduce to give man this characteristic attitude are essential parts of bodily organization, and constitute the structural test which one employs in answering the question whether a particular organism is or is not human. These adaptations of parts are not mere random arrangements or accidental; made without a purpose; they are in response to an essential and anticipated function for the purpose of producing a being capable of taking a distinctive position in the universe superior to that which any other organism has assumed.

If we could imagine a reptile or quadruped to be provided with as highly developed a brain as man possesses, it would be very fair to assume that the horizontal attitude of these animals would greatly impede its full and proper use, so that it could be of very little advantage to them. It would seem to be essential, then, that for the exercise of the higher faculties of man the human brain should be associated or conjoined with the erect attitude of the body.

Assuming the foregoing to be a correct statement, we may with a degree of certainty state that the passage of a vertebrate organism from the horizontal position, in which the back, with its contained spinal column, is uppermost, and the head is in front, to the vertical or correct position of a man, in which the back, with its contained spinal column, is behind, and the head is uppermost, may be taken as expressing the full range or limit of evolution, so far at least as the attitude is concerned, and of which such organisms are capable. Any further evolution in the same direction would throw the back downwards and the head backwards, and would constitute a degeneration rather than an evolution. It would not be an advance in the adaptation of structure to function, but rather the reverse.

In contrasting the bones of the thigh and leg with the Anthropoid apes it will be seen that they possess characters which are distinctly human, but they can be fully appreciated only by having the speci-

mens before you for examination. The human thigh bone is not so broad as in the gorilla, chimpanzee, and orang. These several differences are adapted to the particular function of each animal, in man enabling him to walk in an upright position, while it favors the apes in their various arboreal gyrations and attitudes.

On examination of the human foot while standing it is found that the arched sole is directed to the ground, resting behind on the heel, and in front on the pads, the most important of which is below the joint associated with the great toe, which in man lies parallel to the other toes, and from its size and restricted movements gives stability to the foot. While the ape's foot agrees with man's in possessing similar soft parts, it differs materially as to the uses to which it can be put. Though the foot can be used both for support and progression by bringing the sole upon the ground, yet the animal usually rests upon the outer edge of the foot. And in consequence of the great toe being set at an angle to the other toes—as the thumb in man—the foot can be used as a prehensile organ, and in consequence of this resemblance to the human hand the ape has been called quadrumanous or four-handed.

It has been assumed that the human foot is also a prehensile instrument as well as an organ of support. This is in a limited sense correct, for where the arms have been lost, use has adapted it to services which otherwise would have been performed by the hands. The toes when bent towards the sole can grasp articles, as is done in southern waters, where oysters are procured in great numbers by this manner of fishing. With savages this power is cultivated and preserved to an extent that is hardly possible with civilized man, with whom the too frequent use of tight-fitting shoes and boots has frequently produced a distorting influence which greatly interferes with the functional use of the toes, so that independent movement is often destroyed. Even in savage life, where shoes have never been worn, the power of grasping objects by the toes cannot be regarded as approximating the functional activity of the hand; again, the four outer toes are so short that they cannot encircle an article of any size, and, what is more important, the great toe cannot be opposed to the surface of the sole in the way a man can move his thumb. In cases where, with the loss of arms and persistent training, a pen, pencil, brush, or even a razor can be held and used quite dexterously, it

must be noted that the article is held between the great toe and the one next to it, and not between the great toe and the sole of the foot. In the hand of man the thumb is not tied to the index finger by an intermediate ligament which binds all the fingers together and restricts their separation from each other.

Very different is the case in the human foot, in which the great toe is tied to the second toe by a continuation of the same transverse ligament which ties the smaller toes together, hence it is impossible to oppose the great toes to the surface of the sole in the way in which the thumb can be used. The development of this transverse band for the restriction of the great toe in man is not the only anatomical structure which differentiates it from the thumb. In the hand of man the joint between the bone (metacarpal) of the thumb and the bone of the wrist (trapezium) is concavo-convex or saddle-shaped, and permits of a considerable range of movement in certain directions, and especially the movement of opposition. In the foot of man, on the other hand, the corresponding joint is not saddle-shaped, but is almost plane-surfaced, consequently the range of movement is very limited. One of the chief factors in the production of this movement of opposition in the hand of man is a special muscle which, through its insertion into the shaft of the metacarpal bone of the thumb, draws the entire organ across the surface of the palm. In the human foot there is no special muscle, so that the short flexor of the great toe is in relation to its size very feeble, no special provision being made for a movement of opposition.

The character and direction of the movements of the fingers are imprinted on the integument of the palm. In the palm the oblique direction of the movements of the fingers towards the thumb, when bent in grasping an object, is shown by the obliquity of the two great grooves which cross the palm from the root of the index to the root of the little finger. The deep curved groove, extending to the wrist, which marks off the eminence of the ball of the thumb from the rest of the palm, is associated with the opponent action of the thumb, which is so marked in man that the tip of the thumb can be brought in contact with a large part of the palmar surface of the hand and fingers. Faint longitudinal grooves in the palm, situated in a line with the fingers, express slight folds which indicate where the fingers are approximated to or separated from each other in their

various movements. At times a longitudinal groove marks off the muscles of the ball of the little finger from the rest of the palm, and is associated with its slight opponent action, by the combination of which, with a partial opposition of the thumb, the palm can be hollowed into a cup—the drinking cup of Diogenes. These grooves are present in the infant's hand at the time of birth and have also been recognized in the embryo. They appear in the palm months before the infant can put its hand to any use, they are not therefore acquired after birth. In view of this, they must be regarded as hereditary characteristics transmitted from one generation of human beings to another. They are correlated with the movements of the fingers which give the functional power and range of movement to the hands of man. The character and direction of these grooves are such as one would associate with the hand of an arboreal animal, in which the long fingers are employed in grasping an object more or less cylindrical, like the branch of a tree, and in which the thumb is subordinated.

The power of assuming the erect attitude, the specialization of the upper limbs into instruments of prehension, and of the lower limbs into columns of support and progression, are not supposed to be of themselves sufficient to give that distinction to the human body which we know it possesses. They must have coordinated with them the controlling and directing mechanism placed in the head, known as the brain and organs of sense. The head, situated at the summit of the spine, holds a commanding position. It is balanced on top of the spine by its articulation with the atlas vertebra being placed on the under surface of the skull and not at the back of the head, also the great reduction in the size of the jaws as compared with the ape's and quadruped's enables it to sustain this position more readily. The ligaments supporting it as compared with other localities are comparatively feeble. Its rotation on the axis vertebra by approximate muscles is also possible. The face looks to the front with the axis of vision horizontal; this enables the eyes to sweep the horizon with but limited muscular effort.

The crania containing the brain is of greater capacity than that of other vertebrates, with the exception of the elephant, whale, and porpoise. In these animals the movements of the body demand great sensory motor and emotional centers. Compared with the

weight of the body, however, the brain of man may be said to be heavier, unless birds and it may be some small mammals are an exception. In weight the brain of man averages from forty-eight to fifty ounces, while in woman the average weight is four or five ounces less. But this difference in brain-weight, however, must be correlated with difference in weight of body, though it is estimated that in new-born children the boys have a brain slightly heavier than girls. It has been asserted that if the brain-weight does not reach thirty ounces the individual must be associated with idiocy or imbecility. There would seem then to be a brain-weight necessary in order that the mental functions may be normally discharged. The South African Bush race is said to have a brain-weight which corresponds with the normal infant of civilization.

A fact most valuable to recognize is that there is no fixed time for the nerve-fibers to attain their perfect structure, so that some acquire their complete functional importance before others. The same is true regarding the development of the human brain, so that we have a wide difference in attaining maturity even in the human family. In view of this it is fair to assume that the higher we ascend in the scale of humanity the more complete does self-control become, and the more do the instincts, emotions, passions, and appetites become subordinated to a self-consciousness which regulates our judgments and beliefs.

The capability of erecting the body; the power of extending and fixing the limbs; the range of movements in the joints; the balancing of the head on the summit of the spine; the mass, weight, and structure of the brain with its internal arrangement, are thought to be distinctly human characters. These are the factors concerned in bringing the body of man under the control of reason, intelligence, and self-control, for the discharge of varied and important duties in relation to his Creator, himself, his fellows, the animal world, and the earth on which he lives.—*Brief.*

DENTAL PHENOMENON. By John R. Beach, D.D.S., Clarksville, Tenn. A short time ago an exceedingly interesting and peculiar case came under my observation, possibly no similar occurrence ever being recorded. It was interesting from a surgical standpoint, but of more value to the average practitioner of dentistry,

from the fact that the condition now present is the result of past neglect and improper treatment.

The patient came into my office and inquired as to the cost of extracting a very peculiarly located tooth. I told her, and made an appointment to remove the offending member. The tooth in question was an inferior third molar, erupting externally, showing the well-formed crown through the face on the right side. Its position was about midway between the angle of the inferior maxilla and coronoid process of same. The crown had every appearance of being a *dens sapientiae,* the gingival margin being substituted by a slightly reddened cutaneous attachment. Upon examination of the mouth I found a full complement of superior teeth occupying a normal position in the dental arch. Several lower teeth were missing, the second molar being the only grinder left on the right side, the side from which the tooth erupted. The left cuspid occupied a rather conspicuous position, lying on the surface of the gum horizontally, the mesio-proximal surface of the crown and root fully exposed.

History. The patient is a young colored woman, now twenty-two years of age, of tubercular diathesis inherited from her mother, and of syphilitic diathesis from her father. Her mother was thirteen years old when she gave birth to this, her only child. The family lived in the country, and the child's deciduous teeth decayed early, giving much trouble, but never receiving attention from a dental surgeon. While suffering severely from abscesses, but persistent in her efforts to attend school during a wet season in this condition, she contracted a severe cold. The inception of the trouble dates from this period. Soon pneumonia developed, and while very ill both sides of her face were swollen to an alarming extent. It was impossible at this time to open the mouth without assistance. All nourishment and medicine were taken with considerable difficulty, and swallowing of pus could not be prevented. The discharge was very offensive, so much so that the room had to be kept well aired so that the nurse could stay in it. The girl's condition became critical, but was somewhat relieved by an external eruption of purulent matter on the left side, pus discharging freely and continuing for some time. There is to-day a large cicatrix which marks the eruptive point immediately beneath the second bicuspid, extending

backward to the facial notch. The discharge proved of some benefit, relieving swelling on left side, giving freer breathing space and allowing slight movement of the mandible. The right side remained in a swollen state until the girl recovered. While convalescent the advisability of extracting the molars on right side was considered, but though quite troublesome, this was deemed unnecessary at this time.

Soon afterward a "dentist" who had a portable office (in a wagon) came to our town and "extracted teeth without pain." The fame of this "doctor" spread to her neighborhood, so she came to town and had eight teeth extracted on the right side. Some time after returning home she removed from the body of the inferior maxilla, right side, a large piece of bone the shape of a spool. A week later she extracted three loose lower anterior teeth, alveolar process attached.

For a time it was thought she was relieved notwithstanding there remained slight swelling on the right side. This proved a false hope, for the swelling was persistent and was thought to be of the nature of sarcoma. Different poultices were recommended by her country friends and all faithfully tried. After a while there was noticed an external oozing of putrescent matter at the point over ramus of the jaw which the tooth afterwards occupied. The tooth did not erupt immediately, however, but was some time in making its appearance. The eruption was preceded by the removal of two pieces of bone at intervals of about a month. Not long after the removal of the second piece of necrosed bone the crown of the molar was visible, and after the eruption of the crown was complete the ulceration ceased. A purulent discharge would be induced at intervals from colds, and there would be slight pain in the region of the tooth. The tooth remained in this position for several years before it was extracted.

The right side is apparently swollen now, the facial distortion being very noticeable. There is a drawn appearance of the chin and lower lip to the right, the mental symphysis being about one-half an inch to the right of the median line. If the inferior maxilla is forced to the left the swollen appearance is lessened, and the contour of the face is nearly normal. The girl was ten years old when this trouble began, and the right half of the inferior maxilla does not

seem to be fully developed, but the left side is fully developed and in a normal condition. The tooth would move when the jaw was opened or shut, and seems to be a lower third molar, migrated on account of the loss of bone, the result of necrosis.

This tooth has disfigured the girl's face for life, and made her objectionably conspicuous. This condition probably would not have developed had the child received the proper attention of a competent dental surgeon. Lately I have seen two or three cases where the patients' facial disfigurement was fearful, caused from neglect or improper treatment of abscesses, making it necessary to perform surgical operations for the removal of necrosed bone and infected area.—*Items.*

GIANT SARCOMA. By M. C. Smith, D.D.S., M.D., D.M.D., Lynn, Mass. Read before the Massachusetts Dental Society, June 4, 1902. It is not often that a little girl of less than twelve years of age is presented to this Society twice. Late in the fall of 1894 an alveolar abscess developed, and before it finally healed up she lost the greater part of the inferior maxillary, from the region of the cuspid to the articulation, also the germs of the two bicuspids and the first molar. The attention of this Society was called to the extensive loss and great deformity at that time, but you will see that there was but little deformity prior to the second operation.

February 13, 1902.—In consultation at the Union Hospital, Lynn, I found a little growth on the mucous membrane about a half-inch in diameter and about one-eighth inch in elevation; it looked like a small piece of liver, apparently coming from the periosteum, situated on the anterior surface between the central and lateral incisors, with those teeth noticeably separated. The history of the case is that it had been noticed only about two weeks, and the patient had felt no pain. The surgical staff were almost unanimous in pronouncing it a little granulation tissue from a slight necrosis of the alveolar process. The writer refrained from making a diagnosis, on the ground of the separation of the teeth. Under ether the growth was removed and the bone curetted. A few days later the pathologist reported giant-cell sarcoma. March 12.—Took her to Dr. Whitney at the Massachusetts General Hospital. At that time there was a decided return of the growth; still the doctor did not think there was

any great hurry for a second operation. March 23.—It had been growing so rapidly that we decided to operate at once, which was done at the Union Hospital, assisted by Drs. Lougee, Haywood, Ryder and Smith. The mucous membrane was opened high up on the lip, and the knife carried into the deep tissue almost to the skin and dissected well down on the body of the jaw; on the lingual surface the knife was carried just below the gingival border, and with a periosteal scaler the soft tissue was dissected from the bone; then with a circular saw and the trephine the bone was easily removed, well down below the alveolar process; the bleeding was mostly capillary, and after the large vessels were secured soon dwindled down to an oozing. The bleeding surface was cauterized with five per cent solution of pyrozone and the wound packed with iodoform gauze. April 3.—Left dressing out; healed up nicely. In this case I wish to call attention to the amount of bone that can be removed and show so little deformity.

As we send all specimens of growth that we remove from the mouth to the pathologist, this was sent after the diagnosis was made, and the following is the pathologist's (Dr. Whitney's) report: "The specimen from the girl aged eleven years removed March 23 consisted of a portion of the left half of the lower jaw, contained four teeth, and covered an area of about one centimeter, in which was a soft, reddish new growth. *Microscopic examination* showed the growth to be composed of relatively large, irregularly-rounded and spindle cells with little intercellular substance, among which were cells of a larger size, and contained from one to ten or more nuclei. *Diagnosis.*—Giant-cell sarcoma, probably of periosteal origin."—*International.*

COLORING OF CEMENTS. By Wm. W. Belcher, D.D.S., Rochester, N. Y. The coloring of cements to more nearly resemble the tooth or teeth of the case in hand is not entirely new. A number of years ago the manufacturer of a then popular cement supplied with each package a minute vial of pigment. There was no attempt to classify the pigments, and one might get the darkest pigment with the very darkest shade of powder known to the trade. Opening a new box gave one the thrill that comes to the small boy and his investment of five copper coins in a prize package. However, if one

continued purchasing this particular brand of filling material he became in due time the proud possessor of all the various pigments supplied by the manufacturer. He also found these vials very unhandy, never near by when wanted, while only indifferent results were obtained with the most persistent efforts.

I am using at the present time a number of highly colored lead pencils. To get the required shade the pencil is passed a few strokes over the ground glass slab; the necessary amount of phosphoric acid is then poured on the slab and thoroughly incorporated with the pigment; the powder is finally added, and the three thoroughly mixed.

To obtain good results it is necessary to have a knowledge of the primary colors and their combinations. One will soon learn that a minute quantity of coloring material is abundant. An absolutely white oxid of zinc powder is best to start with as a base. This is not as easily obtained as the darker shades, as it is the most difficult to manufacture, but if one insist it will be supplied. The colors of pencils most used are blue, green and red. For shades the occasional use of the black lead pencil is necessary. Cements are apt to be of a darker hue when combined with phosphoric acid than when in the dry state. If one wishes to experiment with a color or shade, he may incorporate the pigments with a small amount of water, adding the powder. He can then decide definitely on the quantity of the coloring material needed.

Occasionally a patient comes with a facing broken off a crown or bridge; it is necessary that it be immediately restored. The projecting platinum pins make a most excellent anchorage for a pellet of cement, properly colored, contoured and polished with cuttlefish disks, thus restoring the missing facing in corelation with its neighbors until a more opportune time for a permanent operation. I have in my practice cement facings that have been in constant use for over a year, the patient well satisfied, and refusing for the time to have a more permanent operation. The coloring material, so far as I can determine, is as permanent as the filling.

The proper coloring of cements in inlay operations is self-evident. To become an adept in this procedure requires a moderate investment of time and patience, but will well repay the efforts expended by the operator in the more artistic results obtained.—*Dental Off. & Lab.*

The Dental Digest.

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Editorial.

DUTIES OF DENTISTS AND DENTAL SOCIETIES.

Dental societies next to dental journals are the greatest power for good and for progress. If attended as they should be they would far exceed the journals in possibilities. As the matter now stands, however, not more than ten per cent of the men in a state attend or are members of the state society. It is true that the practice of dentistry tends to narrow men, and that there is nothing in the actual work to develop in them a spirit of participation or co-operation. This, by the way, is all the more reason why dentists should attend their professional meetings. However, the narrowing influences of dental work cannot be held entirely responsible for the manifest lack of interest displayed by the average dentist in the meetings and work of his profession. The society itself, or rather the members of it, are largely to blame. In the first place, the meeting should be held at some central point, and the mere fact that a large delegation is present from some remote town in the state should not influence the society to hold its next meeting there. In the second place, the meetings should be well advertised. The custom at the present time with most societies at least is for the secretary to send a notice to some or possibly all of the dental journals a month or six weeks before the meeting. The enormous conventions of the Chicago Odontographic Society and the New Jersey State Dental Society show what energetic committees and judicious advertising can do.

If the work is too hard for the secretary a special committee should be appointed, and the campaign should be started at least six months before the date of convention. Different notices, including the program, should be sent from month to month to every dental journal, and a notice and program should be mailed to every dentist in the state. Since so few men in the state belong to the state society, and since not more than forty per cent of the entire profession take any

dental journal, we feel safe in saying that not more than one-fourth of all the dentists in the state are aware of the existence of the state society in anything more than a general way and many of them do not know when or where its meetings are to be held. It has always seemed to us most unwise for societies to rely upon dental supply houses for their programs and advertising. The programs of the last meeting of one of the largest local societies in Illinois bore the imprint of and were mailed by a dental supply house in the house envelopes. The envelope which contained the program also held an order blank and addressed envelope of the house in question. Dentists should not complain of the journals being controlled by supply houses when they allow their societies to be patronized by them. Aside from this ethical and professional consideration, it might be that those men who did not happen to trade with this particular supply house would be prejudiced against instead of interested in the society.

One great cause for the lack of interest in society work is the way the meetings themselves are conducted. In many cases the convention hall entirely lacks acoustic properties, and it is of course uninteresting and profitless to attend a session when you cannot hear what is being said. We have always argued that presiding officers should be chosen for their efficiency, and not because they are getting old and the society wants to honor them before they drop out, or because they have been faithful in attendance for many years. It is perfectly proper that gratitude should be shown for length of membership, services, etc., but it should not be at the expense of the society. At a recent meeting of a large state dental society one man occupied exactly one-fourth of all the time on discussions, and nine-tenths of what he said was not relevant. At the last meeting of a national organization the discussion on one paper made *seventy-six* typewritten pages. The possibilities of the subject were exhausted in the first few minutes, and then foreign matter was dragged in. In both cases the chair was to blame. The plan advocated by us last month—of dental societies having an iron-clad rule that an essayist must send a typewritten copy of his paper at least one week before the meeting to each of those who have been selected to discuss it—would largely obviate this evil of long, tiresome, and irrelevant discussions. However, even with such a plan in operation,

in order for the meeting to be a success it would be necessary for the presiding officer to know his duty and to have the moral courage to fulfill it. When a man wanders from the subject, or introduces personalities, or repeats what the essayist or other discussors have said, he should be promptly called to order by the chair. This might cause a little hard feeling at first, but it would be better to have a few of the old fogies disgruntled than to have the society stand still or retrograde because of them. It is true that dentistry is largely a mechanical profession, and it is principally because of this that the clinics are always the drawing card at a meeting, but if the literary features were as well cared for they would soon prove as attractive as the clinics.

To sum the whole matter up, every self-respecting dentist should attend the meetings of his state society, and should if possible bring with him something of interest in the way of new ideas, improved methods, etc., and the society should first interest the dentist sufficiently to bring him to the meeting, and when he is there it should so conduct itself, its clinics, sessions, etc., that he will feel well repaid for having come.

PROTECTION FOR HANDPIECES.—To prevent saliva and other fluids getting into the handpiece while preparing teeth either for crowns or for fillings, but especially in the former case, where the use of corundum stones necessitates frequent dipping into water, I invert a rubber cup on the shank of the instrument, the open side thus being toward the handpiece. This absolutely prevents moisture or debris from finding its way into the instrument.—J. Masters, in *Items of Interest.*

DIAGNOSING CARIES.—The microscope has revealed the importance of operating at a very early stage of caries, yet a microscopic examination is not necessary to tell us if caries is in progress. Separate the teeth sufficiently to admit a thin, fine polishing disk. With this disk remove the stained spot that is nearly always to be found where the teeth actually touch each other. If an opaque white spot remains when the stain has been removed the processes of decay have started.—J. Leon Williams, in *Cosmos.*

DETERIORATION IN MOLTEN ZINC OBVIATED.—Zinc, as is well known, becomes sluggish and thick after several meltings, a condition caused by the absorption of oxygen from the atmosphere and of impurities from the melting-pots. To improve it, the following procedure is recommended (*Dental Office and Laboratory*): "The addition of 0.001 of aluminum will render the zinc very fluid. This process is patented, the patents belonging to the Delaware Metal Refinery Company, who sell an alloy composed of zinc and aluminum to add to the molten zinc just previous to pouring."

Notices.

NATIONAL ASSOCIATION OF DENTAL EXAMINERS.

The National Association of Dental Examiners will meet at Asheville, N. C., July 24, 25 and 27, 1903.

J. P. Root, Secy., Kansas City, Kan.

MASSACHUSETTS DENTAL SOCIETY.

The thirty-ninth annual meeting of the Massachusetts Dental Society will be held in the Mechanics Bldg., Boston, June 3-4, 1903.

Edgar O. Kinsman, Secy.

NORTHERN OHIO DENTAL SOCIETY.

The annual meeting of the Northern Ohio Dental Society will be held in Western Reserve Dental College, Cleveland, June 2-4, 1903. The profession is cordially invited to be present.

W. T. Jackman, Secy., Cleveland.

CALIFORNIA STATE DENTAL ASSOCIATION.

The thirty-second annual meeting of the California State Dental Association will be held in San Francisco June 9-12, 1903. The program is an excellent one, and a largely attended meeting is anticipated.

O. P. Roller, Secy., Los Angeles.

PENNSYLVANIA BOARD OF DENTAL EXAMINERS.

The Pennsylvania State Board of Dental Examiners will conduct examinations simultaneously in Philadelphia and Pittsburg, June 9-12, 1903. Address the Dental Council, Harrisburg, for application papers and further particulars.

G. W. Klump, Williamsport.

MASSACHUSETTS BOARD OF REGISTRATION IN DENTISTRY.

A meeting of the Massachusetts Board of Registration in Dentistry for the examination of candidates will be held in Boston June 24-26, 1903. Application blanks and all necessary information will be furnished by the secretary.

G. E. Mitchell, Secy., 25 Merrimac St., Haverhill.

OHIO STATE BOARD OF DENTAL EXAMINERS.

The board of dental examiners of the state of Ohio will meet at the Hartman Hotel, Columbus, June 30-July 2, for the purpose of examining candidates for certificates of registration. All applications should be filed with the secretary by June 20. For further particulars address

H. C. Brown, Secy., 112 E. Broad St., Columbus, O.

CHICAGO DENTAL SOCIETY.

The annual meeting of the Chicago Dental Society was held April 7, 1903, and the following officers were elected: President, Don M. Gallie; 1st Vice-president, W. H. Taggart; 2d Vice-president, G. W. Dittmar; Recording Secretary, W. Girling; Corresponding Secretary, A. E. Morey; Treasurer, C. P. Pruyn; Librarian, J. H. Woolley.

ILLINOIS STATE DENTAL SOCIETY.

The thirty-ninth annual meeting of the Illinois State Dental Society will be held at Bloomington May 12-14, 1903. A large program of valuable papers and interesting clinics has been prepared and a splendid meeting is expected. The railroads throughout the state and from St. Louis will make a rate of a fare and a third on the certificate plan for the round trip. The profession is cordially invited to be present.

A. H. PECK, President. HART J. GOSLEE, Secy., Chicago.

NATIONAL DENTAL ASSOCIATION.

The National Dental Association meets at Asheville, N. C., July 28-31, 1903. Preparations are being made for one of the best meetings in the history of the Association. The Section officers are preparing a program which from a scientific and practical standpoint will be difficult to excel. The clinics will be made a special feature. All dentists interested in the advancement of the profession should attend this meeting. All state and local societies should elect delegates who will be sure to attend the meeting. Each society is entitled to one delegate for every six of its members. The usual railroad rates will be had on all roads in the United States and part of Canada—one fare and a third, on the certificate plan.

L. G. NOEL, President. A. H. PECK, Rec. Sec'y, Chicago.

DENTAL COMMISSIONERS OF CONNECTICUT.

The Dental Commissioners of the State of Connecticut hereby give notice that they will meet at Hartford, on May 21-23, 1903, to examine applicants for license to practice dentistry, and for the transaction of any other proper business. The practical examination in operative and prosthetic dentistry will be held May 21, at 9 a. m., in Putnam Phalanx Armory, corner Haynes and Pearl Streets. The written theoretic examination will be held May 22 and 23, at the Capitol. All applicants should apply to the Recorder for proper blanks, and for the revised rules for conducting the examinations. Application blanks must be carefully filled in and sworn to, and with fee, twenty-five dollars ($25.00), filed with the Recorder on or before May 16, 1903.

By direction of the Dental Commissioners.

J. TENNEY BARKER, Recorder, 8 North Main St., Wallingford.

SOUTH DAKOTA STATE BOARD OF DENTAL EXAMINERS.

The next meeting of the South Dakota State Board of Dental Examiners will be held at Lead, S. D., May 13-14, 1903, beginning promptly at 9 a. m. No candidates for examination will be received after 9 a. m. on the 13th. Those desiring to attend this meeting should take advantage of the Odd Fellows' State Convention excursion rate. This excursion leaves Sioux City, Ia., at 7:30 p. m., May 11.

The Board will also hold a meeting at Redfield, S. D., June 2-3. No candidates will be received after 9 a. m. on the 2d. The South Dakota State Dental Society meeting will be held at the same place June 3-5. All candidates should come prepared to insert gold, amalgam and cement fillings.

G. W. COLLINS, Secy., Vermillion.

MISSOURI STATE DENTAL ASSOCIATION.

The thirty-ninth annual meeting of the Missouri State Dental Association is hereby called for May 19-21, 1903, at Kansas City, Missouri. The spacious banquet hall in the Midland Hotel has been secured, and all meetings and clinics will be held there. Arrangements are being completed for the most successful meeting this Association has held for a number of years.

The Executive Committee has secured some of the best talent in the Great Northwest for this meeting in the persons of Dr. J. B. Willmott, Toronto, Canada, Prosthetic Dentistry; Dr. E. K. Wedelstaedt, St. Paul, Operative Dentistry; Dr. A. C. Searle, Owatonna, Minn., Clinic Operator. These men are all especially adapted to the branches named, and we assure you that nothing but the most urgent reason should allow you to miss this great opportunity. Reduced railroad and hotel rates have been secured and a very large attendance is assured. All ethical members of the profession are cordially invited to attend, take part in the discussions and become members.

The following is a partial program: Addresses and Essays.—Dr. S. C. A. Rubey, Clinton, Mo. President's Annual Address. Dr. T. W. Arnold, Butler, Mo. Some Points on Anesthesia. Dr. B. Q. Stevens, Hannibal, Mo. When and how shall I brush my teeth? Dr. W. M. Carter, Sedalia, Mo. Mutilation of Teeth. Dr. Burton Lee Thorpe, St. Louis. Cavity Linings. A method of protecting the cervical margins in cement fillings. Dr. G. W. Musgrave, Ash Grove, Mo. Forming a Cavity. Dr. Chas. L. Hungerford, Kansas City. Subject to be announced. Dr. D. J. McMillen, Kansas City. Combination Fillings. Dr. R. C. Brophy, Chicago. Lower Dentures. Dr. Otto J. Fruth, St. Louis. Table Clinic. Seamless Crowns and Gold Inlays. Dr. Henry B. Purl, Kirksville, Mo. Table Clinic—Xylonite Plates. Dr. E. S. Brown, Edina, Mo. Table Clinic. Subject to be announced. Dr. W. H. De Ford, Jefferson, Iowa. Table Clinic. Restoration of lost expression by artificial dentures. Dr. L. A. Young, St. Louis. Operative Clinic. Dr. J. J. Brown, Macon, Mo. Operative Clinic. Gold and amalgam fillings without undercuts or retaining pits. Cement cavity lining, soft cement. Dr. A. J. McDonald, Kansas City. Table Clinic. Orthodontia. Dr. R. M. Seibel, Kan-

sas City, Mo. Operative Clinic. Painless pulp extraction and immediate canal filling. Dr. F. B. Moorehead, Chicago. Operative Clinic. Oral Surgery. Dr. P. H. Morrison, St. Louis. Operative Clinic. Removable canal filling. Dr. E. P. Dameron, St. Louis. Table Clinic. Prosthetic aids. Dr. D. J. McMillen, Kansas City. Operative and Table Clinic. Combination fillings. Dr. R. C. Brophy, Chicago. Table Clinic. A cast lower plate. Dr. W. J. Lark, St. Louis. Table Clinic. Shell Crown, and Bridge with Cogswell crown. Dr. K. P. Ashley, Kansas City. Operative Clinic. Porcelain Inlay. Jenkins' System.

OTTO J. FRUTH, Cor. Sec'y.

LATEST DENTAL PATENTS.

717,094. Box-tooth Crown and Adjustable Facing, Byron W. Haines, San Francisco, Cal.

717,158. Artificial Tooth and Anchor, Samuel S. Bloom, Philadelphia, Pa.

717,402. Tooth-powder Receptacle, Thomas O. Holland, Philadelphia, Pa.

717,594. Dental Broach, Wm. J. Miles, Jr., Middletown, Ohio.

718,401. Dental Finishing-Strip Package. Jacob A. Thomas, Hanover, Pa.

718,561. Attachment for Dental Engines, Claude R. Basford, Healdsburg, Cal., assignor to Basford Mfg. Co., San Francisco, Cal.

718,772. Dental Napkin-holder, Henry A. King, New York.

719,312. Dental Disk-holder, Edward J. Douhet, Cleveland, Ohio.

719,834. Dental Matrix Retainer, John Mills, Brantford, Canada.

719,928. Dental Crowns, Evart W. Williams, Argyle, Wis.

719,964. Artificial Tooth, Walter F. Wheeler, Spencer, Mass.

720,105. Dental Impression Cup, Georges A. Brouillet, Boston, Mass.

720,394. Dental Charcoal Point, Louis Arndt, Jersey City, N. J., assignor to S. S. White D. M. Co., Philadelphia.

721,528. Rack for Holding False Teeth, Ormond E. Wall, Honolulu, Hawaii.

721,655. Tooth-regulator, Edward H. Angle, St. Louis, Mo.

722,033. Dental Clamp, Wm. A. McCarter, Topeka, Kans.

722,699. Tooth-powder Box, Wm. H. Hall, New York.

722,726. Dental Flash-press, Theodore G. Lewis, Buffalo, N. Y.

722,765. Dentists' Flask, Andrew S. Steigerwald, Philadelphia, Pa.

723,102. Artificial Tooth, Thomas H. Whiteside, Youngstown, Ohio.

723,275. Dental Flask, John Hood, Hyde Park, Mass.

723,384. Dental Mandrel, Julius Harris, New York.

723,546. Dental Crown-holder, John W. Place, Tuckahoe, N. Y.

723,661. Dental Cabinet, Daniel A. Evans, Ashley, Pa.

723,710. Dentists' Spreading-screw Elevator, Harry T. McCune, Braddock, Pa.

723,872. Dental Handpiece, Willy Homann, Dusseldorf, Germany.

723,942. Dental Mold Willard Streetman, Cleburne, Tex.

723,998. Dental Flask, John H. Feagan, Spartanburg, S. C.
724,838. Dental Disk-mandrel, Sidell E. Fish, Greenport, N. Y.
725,033. Dental Chair, Isaac N. Brigham, Cleveland, Ohio, assignor to A. Hoeffer, A. M. McCarty, A. C. McDowell, Canton, Ohio.
725,081. Tooth-pick, James E. Hills, New York.
725,506. Dental Plate, Samuel G. Supplee, New York.

DR. S. B. PALMER.

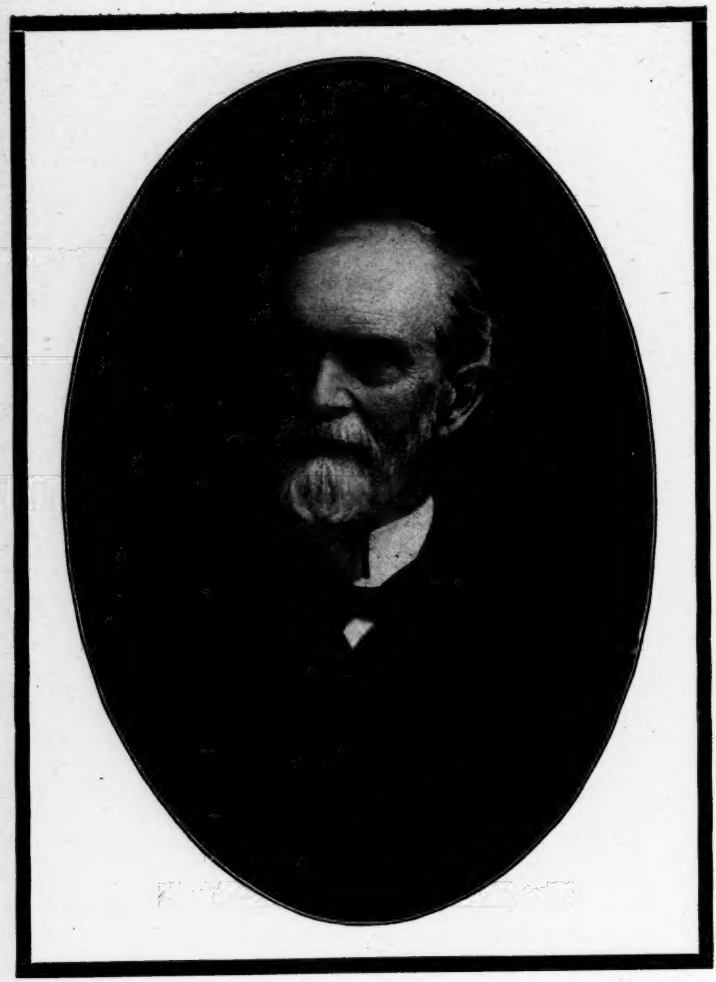
A noble man, who in practicing our profession bestowed honor upon it, has passed from our midst.

Stewart Bailey Palmer died at his home in Syracuse, New York, on March 30, 1903, aged eighty years, six months and thirty days.

He was one of the pioneers of dentistry in the section of the country where he lived, and where he had a long professional life marked by the constant endeavor to keep his work up to the highest possible standard of professional excellence. That he succeeded in this is evidenced by the high esteem in which he was held by all those on whom he displayed his manipulative skill.

Dr. Palmer was one of those men whom circumstances and environment cannot suppress. Born and brought up on a farm, far away from any village, he received but scanty training from the country school of the district where he resided, as his duties at home prevented him from attending the school regularly, but the limited education acquired there did not satisfy his thirst for knowledge, for he was a born investigator. When quite a boy the copy of Comstock's Philosophy which was placed in his hands at school fired his ambition to know all about the various subjects of which it treated, and thenceforth every moment he could spare from his regular duties was devoted to study and the acquisition of knowledge. In this way he qualified for a course at the Cortland Academy, a high grade school, which he entered and took one term of instruction, which was all he could afford at that time. He finished this course in 1846, being then 24 years of age, but he was still unsatisfied and longed to be able to study and experiment along the lines of the knowledge he had acquired there. To do this he must have tools and material, but he had no means with which to get them. Shortly after he left school he was offered the position of teacher of the district school at Tully for the year 1847. This he gladly accepted. Here was an opportunity to get tools and whatever he wanted to pursue the studies that would give him the longed-for knowledge.

With the meager means thus acquired, and amid many difficulties, he succeeded in constructing models of most of the implements and machines described and pictured in Comstock's Philosophy, which was the leading textbook used in the schools at that time. Among them were working models of a steam engine, an electric machine, a galvanic battery, etc. Here he was storing up useful practical knowledge and gaining manipulatory skill in de-



STEWART BAILEY PALMER.

partments of science, which were soon to be put to a practical test that was to determine the destiny of his life.

His teeth were of poor quality and many of them were destroyed by disease early in life. During the year 1847, while teaching school, he had nine of them extracted, but he could not then afford to pay for an artificial set, although their loss made him very uncomfortable. At that time the plates on which teeth were mounted were made of either gold or silver. Although up to this time he had never been inside a dental laboratory or examined closely an artificial denture, as he became skillful in the use of tools he often wondered if he could not make something that would relieve his discomfort. While in this condition he happened to see in a drug store in Syracuse a book with a set of artificial teeth delineated on the cover. Upon examining it he found it was a treatise on dentistry, with illustrations, describing the mode of constructing artificial dentures. He asked if the book was for sale, and was told that the price was five dollars. He did not have that much money with him, but he borrowed three dollars and bought that book. He studied the contents until he thought he had acquired the necessary knowledge and then determined to make a set for his mouth. He hammered out a plate from a silver dollar on an anvil in a blacksmith's shop, and succeeded so well that he was solicited to make several artificial dentures for other people. In all cases of this kind that he undertook his success was so complete that he determined to adopt dentistry as the occupation of his life, and thus he entered upon a calling in which he was destined to become celebrated.

Having decided upon this course, he devoted all of his indomitable energy to acquiring a thorough knowledge of all the best methods as practiced by the eminent men of his chosen calling in those days. To gain this information he sought interviews with all the distinguished dentists he could reach, and it is needless to say that he succeeded in obtaining what he desired.

In the following year, 1848, he became associated in practice with Dr. John L. Allen at Fabius, which association continued until 1850, when he started in practice by himself in Lafayette. In the same year he married Miss Elizabeth Jane Savery, now deceased. In 1851 he moved to Tully and remained in practice there until 1866, when he removed to Syracuse and entered into partnership with Dr. Amos Wescott, with whom he remained until 1868, when they separated and he opened an office for himself, and from that time until he retired, about two months before his death, a period of thirty-five years, he continued to practice his profession in Syracuse, making altogether a continuous practice of fifty-five years.

He stated that from the moment he entered the dental profession his education was a continuous advance throughout the whole of this long term, and that he was constantly stimulated by a desire for thorough knowledge, and was aided by dental literature and attendance upon dental meetings. Early in his practice he became a member of the American Dental Association, joining in 1864 and always retaining his membership. In 1876 he was elected a member of the New York Odontological Society. He assisted in the organization of the Dental Society of the State of New York in 1858, and in 1868 he re-

ceived from it the degree of M. D. S., Master of Dental Surgery. He was also an officer of the Fifth District Dental Society of the State of New York and a member of the Syracuse Dental Society. In 1872 he was elected a member of the board of censors of the State Dental Society; and he continued a member until 1895, when the Legislature of New York gave the power of granting licenses to practice dentistry to the Regents of the University, and created a board of examiners to examine the candidates applying for such licenses. Dr. Palmer was appointed a member of that board when it was organized and continued in that capacity until he died.

During the whole of his long professional career he continued to be a close student in the different departments of science, particularly in those that could in any way be utilized in his practice. In the early part of his professional life his investigations were principally carried on in the departments of mechanics and chemistry, but later his investigations were directed to the subject of electricity, in which branch of science he became an enthusiastic student and investigator, which resulted in his promulgating the theory of "Vital Electricity" and its application to the cure of disease, particularly to those diseases that are treated by the dentist. In this direction he claimed to have made some important discoveries. Like all men who promulgate new ideas, he met with those who opposed his views, but Dr. Palmer was always a careful and patient investigator, and never put forth any theory until he was thoroughly convinced that it was a correct one. Having promulgated his conclusions he did not seem to care to argue with those who opposed them, but contented himself with the remark: *"Well, time will tell whether I am right or not, and I can afford to wait."* Above all things he disliked a wrangle, and he was always a peacemaker, for nothing seemed to distress him so much as a dispute or quarrel, and when one occurred where he was, either among his friends or during the meeting of a society he was attending, his whole energy and influence would be at once exerted in the cause of peace and good will.

Dr. Palmer was an extensive contributor to the literature of his profession, and his contributions are a valuable part of its scientific accumulations, and they will become more and more valuable when they are better known.

Some years ago Dr. Palmer, in connection with Dr. Flagg of Philadelphia, announced their doctrine of "The New Departure" in dental practice, which announcement caused the greatest sensation that has ever occurred in the dental profession. The New Departure was received with violent opposition by a large majority of the best practitioners of that time, and it would not have been considered at all if it had not been for the great respect that was entertained for the character and attainments of Dr. Palmer. He was known to be a careful and reliable investigator, and was a man in whom everybody had faith, so the new doctrine was considered, and investigation and time proved that it was a true one. Dr. Palmer lived to see it acknowledged as such, so his motto, "Well, time will tell whether I am right or not," was verified and time developed the correctness of his theory and his justification in presenting it.

There was combined in his character a large amount of amiability and gentleness with great firmness of character, and an indomitable will when it became necessary to use it, but in his ordinary intercourse with his fellow men he was courteous, with a happy, congenial manner that made him a most charming and intelligent companion. Dr. Palmer was a large hearted man, with a nature overflowing with kindness, good will and affection, and to his intimates and friends his personality will ever be a most pleasant memory, for he was one of the truest of men where he gave his friendship or love.

As regards his domestic relations, one who knew him and his family intimately has said of his household, that it was the most harmonious and the happiest one he has ever known.

Dr. Palmer's official duties as a dental examiner brought him in contact with many young men. In all young practitioners he was always deeply interested, and to many of them his kindly advice and assistance was always encouraging, and sometimes he was able to direct their career to a successful result.

His intercourse with his professional brethren was of the character that always commands respect, and those who knew him well will remember their acquaintance with him as a bright green spot in their lives. To his fellow townsmen, his death was an irreparable loss, for he had been a member of their community for over thirty-five years and was known to all the principal people of the town, who all respected and honored him as one of their most distinguished citizens. The large attendance at his funeral showed their appreciation of his worth and their desire to do honor to his memory. The Syracuse Dental Society attended in a body, and there were also present over a hundred dentists from different parts of the country. The organizations represented at the funeral services were the National Dental Association, the New York State Dental Society, the Fourth, Fifth, and Seventh Dental District Societies of New York, the New York Institute of Stomatology, and the Syracuse Dental Society.

The case of Dr. Palmer is the only instance in the history of the dental profession where the death of one of its members has created a universal demonstration of sympathy and sorrow in so large a community as that of Syracuse, and it illustrates the magnetic character of the man, and the influence his splendid qualities had upon the people with whom he lived.

G. Lenox Curtis.

News Summary.

D. V. Dailey, a dentist at Stuart, Ia., died Mch. 7, 1903.

M. Sanborn, a dentist at Kingston, N. H., died April 13, 1903.

A. B. Bauer, 30 years old, a dentist at Milwaukee, died April 6, 1903.

George Robitoy, 64 years old, a dentist at St. Louis, died Mch. 9, 1903.

T. A. Lyon, 72 years old, a dentist at Camp Point, Ill., died April 5, 1903.

G. H. CRARY, 62 years old, a dentist at Red Wing, Minn., died April 26, 1903.

LEROY F. KEATING, 35 years old, a dentist at Troy, N. Y., died April 5, 1903.

JOHN MAHONY, 79 years old, a dentist at Richmond, Va., died April 2, 1903.

H. P. SHAW, a dentist at Malden, Mass., died April 10, 1903, from appendicitis.

OTTO ARNOLD, 49 years old, a dentist of Columbus, O., died April 1, 1903, of tuberculosis.

REALISTIC.—One dentist advertises to make teeth "which look so natural they fairly ache."

JAMES DOUGLAS, a dentist at Jamestown, N. Y., died from uremic poisoning Mch. 22, 1903.

W. H. HOLLIS, 46 years old, a dentist at Cambridge, Mass., died April 5, 1903, of peritonitis.

A. H. WHITMER, 33 years old, a dentist at El Paso, Tex., committed suicide Mch. 5, 1903.

L. G. DEAN, for many years a dentist at Vassar, Mich., died Mch. 17, 1903, from pneumonia.

GEORGE MCKIRGAN, a dentist at Passaic, N. J., died April 8, 1903, from an overdose of morphin.

CASUALTIES.—A man at Silver Cliff, Col., recently had a tooth pulled and nearly died from blood poisoning.

A. T. WINEMAN, 34 years old, and formerly in practice at Austin, Ill., died at Phoenix, Ariz., Mch. 10, 1903, from consumption.

DES MOINES COLLEGE OF DENTAL SURGERY will have as dean Dr. Frederick Knott. He was chosen April 7, 1903, by the trustees to fill the position.

EMPEROR HONORS DENTIST.—April 15 Emperor William conferred on Dr. A. P. Sylvester, one of the pioneer American dentists in Berlin, the title of Court Councilor.

MUMMIES FOR SOCIETY.—Two mummies of the Inca Peruvians have been presented to the New York Odontological Society, and examinations will be made of their teeth.

WAYNE COUNTY (IND.) DENTAL SOCIETY was organized April 17, 1903, and the following officers were elected: President, J. W. Jay; Vice-president, C. S. Wilson; Secretary and Treasurer, A. B. Price.

DIVORCE.—Wm. Kramm, a dentist at Peoria, Ill., is defendant in a suit for divorce brought by his wife, who claims that he has not only failed to support her but has been guilty of the most extreme cruelty.

FIRES.—C. G. Bacon, Newman, Ill.; Mch. 26, loss $500, insurance $200.—G C. Sharp, Marshall, Mo., April 15; loss $100.—Z. V. Rany, Logan, O.,

April 9; loss $500, fully insured.—E. Sibiakaffsky, Pittsburg, April 21; nominal loss.

Racine (Wis.) Dental Association was organized Mch. 30, 1903, and the following officers were elected: President, F. B. Washburn; Vice-president, F. L. Clifford; Secretary, M. L. Fancher; Treasurer, L. E. Hall.

Texarkana (Tex.) Dental Society was organized April 9, 1903, and the following officers were elected: President, P. A. Skeen; Vice-president, T. A. Simms; Secretary and Treasurer, A. E. Chambers.

Fatalities.—April 18 a man at Plainfield, N. J., died of blood poisoning which followed the extraction of a tooth.—April 22 a young man of Pittsburg committed suicide while temporarily insane from the pain caused by aching teeth.

Mason Detachable Tooth Co. Insolvent.—On application of the secretary of the corporation, April 15 a receiver was appointed for the Mason Detachable Tooth Co. It is stated that the liabilities are $15,000 and the assets $6,000.

Dental Society of the Chickashaw Nation was organized at Ardmore, Ind. Ter., Mch. 24, 1903, and the following officers were elected: President, J. S. Abernathy; Vice-president, E. O. Nicholson; Secretary and Treasurer, P. D. Pennell.

Capitol City Dental Association was organized at Lansing, Mich., April 7, 1903, and the following officers were elected: President, George W. Coleman; Vice-president, A. N. Lawrason; Secretary, Ralph Morse; Treasurer, Wm. T. Shaw.

Bankrupt.—Edward B. Fuller, a dentist at Milwaukee, on April 20 filed a voluntary petition in bankruptcy. He scheduled his liabilities at $899 and his assets at $788, in bills receivable. He evidently does not expect to have those bills paid.

Third District Dental Society of New York State held its thirty-fifth annual meeting April 21, 1903, and elected the following officers: President, M. J. Barrett; Vice-president, J. W. Canaday; Treasurer, P. S. Oakley; Secretary, C. E. Allen.

Fourth District Dental Society of New York State held its thirty-fifth annual meeting April 21, 1903, and elected the following officers: President, L. A. Timerman; Vice-president, W. S. Rose; Secretary, E. B. Rinehart; Treasurer, E. Doolittle; Correspondent, J. Barraclough.

Southeastern District of Massachusetts Dental Association held its annual meeting April 15, 1903, and elected the following officers: Secretary, F. O. Kidd; Treasurer, A. F. Wyman; Executive Committee, E. F. Flynn, W. J. Mitchell, A. L. Gould; Member Executive Council, N. A. Stanley.

Needlessly Alarmed.—A missionary in Brazil was told by two native physicians that he had cancer of the cheek, so he came all the way to New York for operation. Fortunately he fell into the hands of a good dentist, who simply extracted an offending tooth and relieved the entire difficulty.

SERUM FOR WHOOPING COUGH.—According to a cable despatch to the *New York Sun*, a young physician of Brussels named Leureaux has discovered a serum which will effect a cure in whooping-cough within eight to ten days after its injection.

ADVERTISERS DEFIANT.—A dentist at Black River, N. Y., has gone into the advertising business, and the Jefferson County Dental Society has given him his choice of stopping the practice or being expelled. He defies the organization and threatens to start a rival society if any action is taken against him.

FIFTH DISTRICT DENTAL SOCIETY OF NEW YORK STATE held its annual meeting April 15, 1903, and elected the following officers: President, S. Slocum; Vice-president, G. A. Potter; Secretary, A. B. Wells; Correspondent, F. W. Fisher; Treasurer, I. C. Curtis; Librarian, F. R. Adams; Censors, F. B. Nellis, A. Ritter, A. R. Cook.

SEVENTH DISTRICT DENTAL SOCIETY OF NEW YORK STATE held its annual meeting April 15, 1903, and elected the following officers: President, F. Messerschmitt; Vice-president, L. S. Goble; Recording Secretary, C. F. Bunbury; Corresponding Secretary, G. G. Burns; Treasurer, L. Requa; Member Board of Censors, F. L. Sibley.

EXPLICIT.—The Dental Protective Supply Co. recently received the following order from a customer—"Please send me a set of 28 gum teeth of medium size and bite but not too wide. I want them for a lady who is five feet three, dark complexion, and weighs 130 pounds. If you have sample to order by please send me same." Did he mean sample lady or sample tooth?

PROPER TREATMENT AT WHICH TO POUR ZINC.—Take a piece of dry, white pine wood and thrust it into the molten zinc for about four or five seconds. If it is badly charred or fires, the metal is too hot. If charred only slightly, say a coffee-brown color, it will be about the right heat to pour. The cooler you can pour the zinc the better it will flow—that is, after the zinc is fluid.—Theo. F. Chupein, in *Dental Office and Laboratory.*

IO DIED ANYHOW.—Patient—"Interested in mythology, doctor?"

Doctor—"Only in a general way."

"Well, according to some tellers Io was gored to death by a bull."

"Poor lady."

"Yes, but it seems that the story as we have it is all wrong. Only a few days ago I received a druggist's price list that said Iodide of potassium."

CALCIUM PEROXID AS A DISINFECTANT FOR CARIOUS TEETH.—In a series of experiments with calcium peroxid as a disinfectant for the mouth it was found that carious teeth kept in a solution of calcium peroxid in distilled water lost their germs in a short time. A tooth-powder containing calcium peroxid (about 10 per cent) proved efficient in destroying all germs in carious teeth in thirty minutes of contact.—Sophie Hornstein (*Roussky Archiv. Patol.*)

BLUE LIGHT AS AN ANESTHETIC.—(*Odontologische Blatter.*) The interesting observations of the Russian physician, Dr. Minin, regarding the anesthetic effect of blue rays are here recorded. It appears that the reflection of blue light is rapidly followed by insensibility to pain, and that in this way Dr. Minin has found himself able to relieve his patients from the pain accompanying acute inflammation of the skin and mucous membrane. He uses a fifty-candle-power light and throws the blue rays for from ten to twenty minutes upon the surface to be anesthetized.

TINCT. CALENDULA.—The remedy is new to many practitioners, but it fills a very important place in the treatment of lacerated gums from any cause. It is found beneficial if applied after using the clamp or polishing strips between the teeth, and after fitting bands or adjusting crowns or bridges. It may also be used with benefit in ulcerated patches, and as a stimulating application in bleeding, flabby conditions of the gums. It can be freely used and is preferred in most cases to the stronger counter-irritants so commonly used in these conditions.—W. H. Hersh, Chicago. *Review.*

FATHER THOUGHT RIGHT.—At a recent meeting of a scientific organization one of the members called attention to the newspaper reports of several deaths that were laid at the door of Christian Science. One member was asked if he thought it really possible that a cure could be effected by the doctrine. In reply he told the story of a boy who encountered a Christian Scientist, and was asked:

"How is your father?"

"Father's feeling bad, and complains very much of his health," replied the boy.

"Nonsense!" commented the C. S. "He only thinks he's ill. Tell him that the next time he complains. Tell him he only thinks he's ill."

Two or three days later they met again, and the C. S. asked:

"How is your father to-day?"

"Father—father think's he dead, sir," replied the boy, hesitatingly.

OIL OF CLOVES.—W. A. Briggs reports in *American Medicine* an extended experience with clove oil as a disinfectant for the hands of the surgeon, obstetrician, and nurse, and also for the operative field. He has used it in varying strength, with a diluent of olive or other indifferent oil—from pure to twenty per cent—as a dressing for lacerated, punctured, incised, and contused wounds, and for the umbilical cord; all with marked success and satisfaction. He sums up its advantages,—viz., 1. Practically non-toxic. 2. Locally distinctly analgesic and powerfully antiseptic. 3. A quick, ready, and simple means of accomplishing results.

ILLEGAL PRACTITIONERS.—Suit has been brought against a dentist at Germantown, O., by a rival who claims that the defendant is violating the state dental law by not displaying his certificate in a branch office.—A dentist at Minneapolis was recently fined $25 for practicing without a license.—A dentist in Washington recently applied for a writ of mandamus to compel the state board to issue him a certificate. The case has been carried to the supreme court and the board has been upheld.—The New York State Dental

Society is after a man who for several years has practised dentistry in various parts of the state without a license.

"SWALLOW IT."—A young man recently had a tooth extracted, taking gas, and he thus describes his sensations—"Through a window in front of the chair I could see a tall chimney. As the dentist began to administer the gas this chimney began to spin around slowly, but gradually increased the size and speed of its revolutions until all I could see was a dizzy blue. Suddenly it stood still, and then exploded with a crash, scattering bricks in every direction. One of them hit me in the head and I went to sleep. When I awoke the dentist was standing over me with a glass of water in his hand. 'Swallow it,' he said. 'What,' I asked, 'the brick?' "

ANESTHETICS FOR CHILDREN.—The general idea that chloroform is the safest anesthetic in childhood is refuted by T. H. Halsted in the *Philadelphia Medical Journal.* He regards it as more dangerous then than at any other period of life, and quotes Wyeth, who uses chloroform almost always in adults, but ether invariably with children. Chloroform is especially to be avoided when there is any glandular enlargement, for Kolisko has pointed out that in cases of death during anesthesia in which heart and kidney lesions were not found, there was invariably found a condition of "habitus lymphaticus." This condition is often noted in children, in whom aberration of the lymphatic system is common.

EXAMINING BOARD AFFAIRS.—L. H. Chamberlin has been appointed a member of the New Mexico Board.—At the last meeting of the Massachusetts Board 49 out of 84 applicants passed the examination.—The Utah State Board held its annual meeting April 13 and elected the following officers: President, G. E. Ellerbeck; Vice-president, W. G. Dalrymple; Secretary and Treasurer, H. W. Davis.—F. C. Barlow, Jersey City, N. J., has been reappointed on the board of that state.—F. H. Sutherland of Denver has been appointed on the Colorado State Board in place of H. F. Hoffman, resigned. The board met April 8 and elected these officers: President, F. H. Sutherland; Secretary, M. S. Fraser, Denver; Treasurer, George I. Warner.

AN EARLY RECOGNITION OF THE VALUE OF MANUAL TRAINING IN DENTISTRY.—That manual training was considered in the early years of modern dentistry as a factor in the education of the dentist can be seen in the following quotation from Dr. Amos Westcott in the *American Journal of Dental Science* for December, 1846: "The supposition that theory alone will qualify students as practitioners of dental surgery is as absurd as to suppose that Sivori or Ole Bull had attained their almost superhuman skill upon the violin by merely listening to the enchanting strains of the immortal Paganini. To acquire that dexterity of hand necessary to perform the nice and delicate operations upon the teeth, just as in the execution of music, the hand must be educated, or failure is inevitable."

INFLUENCE OF ALCOHOL UPON THE NATURAL RESISTANCE.—Goldberg (*Centralblatt für Bacteriologic and Parasitenkunde*) states that as the result of an interesting series of experiments he arrives at the following conclusions:

1. Doves, which are naturally immune against anthrax, become subject to infection after moderate doses (2 to 3 c.c.) of 40 per cent brandy, which produces only transient alcoholic intoxication, but does not result in the death of the animal. 2. Chronic alcoholic intoxication diminishes the natural resistance of doves to anthrax. 3. Small doses of alcohol repeatedly given to doves infected with fatal doses of a culture of anthrax do not save the bird, and only exceptionally prolong their lives in comparison with control doves; sometimes they cause apparently earlier death of the bird.

ACTION OF TOBACCO SMOKE UPON CERTAIN MICROBES OF THE MOUTH.—By Em. Dunon, France. (*Presse Medicale.*) The author has found that tobacco smoke has no action upon the development of the bacillus of tetanus, the typhoid bacillus, or leptothrix buccalis, but that it interferes greatly with the evolution of the bacillus diptheria, the bacillus tuberculosis, and the staphylococcus, and sometimes completely arrests the development of these species. This action upon certain micro-organisms is not due to nicotine but to the other products of the combustion of tobacco.

FACIAL AND ORAL DEFORMITIES IN EARLY LIFE.—It is surprising how a little habit, daily indulged in, will deform the features of the face in early life, when the cartilaginous and bony framework is soft and pliable. Pulling the lobes of the ears, the lower lip, the eyebrows—each habit has its nemesis in some unnatural result. I once had under my daily observation a lad who had caused a considerable protrusion as well as torsion of the left central and lateral incisors from the inveterate habit of biting the left thumb-nail, and I am convinced that many cases of irregularities of these teeth are due to just such simple but undetected causes.—W. George Beers, in *Dental Hints.*

MIXING OF CEMENTS.—It is a known fact that one chemical for which another has an affinity will take up an exact quantity—no more and no less under any circumstances. In mixing cement composed of zinc oxid and phosphoric acid, if the "mix" be too thin there is an excess of phosphoric acid, and this acid will wash out. If the "mix" is too thick there will be an excess of powder, which simply remains as inert material, causing the plug to crumble. The only possible way to overcome the defects would be to carefully weigh out the exact quantities, a thing the ordinary practitioner has neither the means nor the time to do. It is my belief that, without exception, those fillings which have proved durable were accidentally mixed in the exact proportion necessary to produce a perfect chemical compound.—A. A. Wilcox, *Dominion Journal.*

MARRIED.—H. W. C. Bodecker, Berlin, Germany; Anna F. M. Jurianz, Berlin, Mch. 17. The groom is the eldest son of Dr. C. F. W. Bodecker.—A. P. Cote, Woonsocket, R. I.; Antonia Farley, Woonsocket, April 15.—S. C. Dayan, Syracuse, N. Y.; Cynthia Sinclair, Syracuse, April 9.—W. S. Flower, Pittsburg; Elnora Lockhart, Pittsburg, Mch. 28. The bride was heiress to several million dollars, but her father has disinherited her.—F. O. Hanson, Racine, Wis.; Anna Nelson, Racine, April 14.—E. L. Jones, Moke-

lumne Hill, Cal.; Lillie M. Peek, Mokelumne Hill, April 2.—A. F. Lewis, St. Louis; Anna Blank, Las Vegas, N. M., April 2.—E. C. Macy, Cottage Grove, Ore.; Emma E. Banzer, Portland, Mch. 10.—H. C. McMullen, Cambridge, Ill.; Ellen C. White, Kewanee, Ill., Mch. 25.—J. T. Pyles, Frederick, Md.; Charlotte E. Bowers, Frederick, Mch. 30.—U. B. Shantz, Kewanna, Ind.; Mabelle E. Bonner, Kewanna, April 26.

SALIVARY CALCULUS IN THE SUBMAXILLARY GLAND: DIAGNOSIS BY X RAYS. By Prof. Geroba, Bucharest (*L'Odontolgie*). The diagnosis of salivary calculi of large size is almost always an easy matter, because as a rule they occupy the ducts of the different salivary glands, and when they acquire large proportions they are readily detected by the patient, but in this case the calculus was lodged in the substance of the gland and diagnosis of its presence was made possible only by the use of the Röntgen rays. The patient was operated upon, and a calculus weighing ninety grains and having a diameter of about one inch was removed.

DAMAGE SUITS.—Some time ago a woman at Terre Haute sued her dentist for $10,000 damages, alleging that blood poisoning set in after he extracted a tooth. The case has been bitterly fought on both sides, and the dentist has finally proved that it was simply a case of blackmail and the suit has been decided in his favor.—A woman at Pittsburg recently had some teeth pulled and an impression taken at a dental parlor in that city. A few days later she returned for her plate, but by mistake got into another dental parlor near the first one, and the proprietor took an impression of her mouth, charging her $5. She is now suing him for obtaining money under false pretenses.—A woman in Chicago has sued a dentist for $5,000 damages, alleging that she has been sick ever since he worked for her.—A woman at Cumberland, Md., recently had some work done by a dental firm and paid half the amount due. She was not satisfied with the work, so one of the operators took off the crowns and bridges and refused to replace same until the account was paid. The woman sued for $3,000 damages and has been awarded $150.—A woman in Chicago recently went to a dentist to have several teeth extracted, and during the operation he broke her jaw. Upon her bringing suit against him it was discovered that he was practicing without a license, so he is in trouble all around.—A woman in Spokane, Wash., has sued a dental parlor for $600 damages, claiming that because of the careless administration of cocain and the use of unclean instruments she was poisoned.—Another woman in Spokane has sued another dental parlor for $1,000 for personal injuries resulting from unskillful work.—A woman in Philadelphia has sued her dentist for damages, claiming that in pulling a tooth he dislocated her jaw.—A man in Portland, Ore., recently sued his dentist for $1,035 damages, and the jury awarded him $1.—One of the promoters of the Daly Gold Lining Dental Co., which we announced last month was bankrupt, has been sued by a woman who claims that she gave him $350 to secure for her a position where bond was required, and that he has not only failed to obtain the situation for her but has refused to return her money.

LIGHT MOST INJURIOUS TO THE EYES.—A Russian physician has made experiments to ascertain the kind of light that is most injurious to the eyes. He has based his researches upon the well-known fact that the more tired the eyes are the more frequently they will close. Placing a person before the light of a candle he found that the eyes closed at an average of 6 4-5 times per minute; placing the same person before a gaslight he found that the closing of the eyelids averaged 2 4-5 times per minute. Then, using sunlight and electricity, he found that under the influence of the electric light the eyes closed the least number of times. He concludes that electric light is the least and candle light the most injurious to the eyes.—*Cosmos.*

TITLES.—The "D. D. S." has at times been characterized as a badge of partial culture, the "M. D." only bordering on the complete. The badge that fits may be small, but it is "tailor made;" the one that fits "too quick" is too often a merely "ready to wear." A distinguished theologue thus touches off the gentleman of large badge but short beat: "The specialist, like the sky on a wild night, shines only in spots, elsewhere the darkness is of the kind which belonged to the negro who was so black that a bit of coal wrote white on him. It must have been a specialist who, under the guise of a Scottish minister, settled in a country parish, and was asked to pray for rain. He did so and the rain came down in floods and destroyed the crops. Irritated at the result, one elder confided to another that 'this comes o' intrustin' sic a request to a meenister wha isna acquent wi' agriculture.'"

EPULIDS AND THEIR TREATMENT.—By Dr. Oscar Amoëdo, Paris (*La Odontologia*). Dr. Amoëdo begins his elaborate communication by calling attention to the fact that dentists have greater opportunities of diagnosing the presence of epulids than surgeons, and that while the latter are called upon to treat these growths when they are already in full evolution, the dentist can discover them at their beginning and thus can apply the necessary means to check their growth and bring about their cure. After a careful study of the pathological anatomy of these neoplasms, and after an intelligent discussion of the etiology, symptomatology, course of the disease, prognosis, and treatment, the author presents the following conclusions: Epulids in general are benign tumors from a clinical standpoint, no matter what their histological characteristics may happen to be. The dentist, because of the frequent inspections of his patients' mouths which he is called upon to make, should diagnose them from the beginning, even if patients ignore their presence. Chemical cauterization with chromic acid, thermal cauterization with the thermo-cautery or galvano-cautery, are methods which should be followed. Removal of tartar, with buccal antisepsis, constitutes one of the bases of treatment. In cases in which the disease extends itself so as to involve a considerable area the dentist should turn over his patient to the surgeon.

TUBE CROWNS.—In those cases of repair or replacement wherein the original crown has been broken away, leaving the end of the dowel projecting slightly and yet still secure in its attachment to the root, a well adapted crown may often be made without removing the dowel, which is sometimes difficult and often dangerous. In the procedure the end of the dowel should be squared

up and a tube made to fit it. This may be made of platinum foil about No. 40 to 60, or of pure gold about thirty-six gauge, and the joint should be soldered and the tube well reinforced in either instance. If the crown is to be constructed with gold, a base of pure gold of the same gauge should be then perforated and adapted to the root and soldered to the tube, and the open end of the latter closed with a small disk of plate at the same time. Where it is desirable to construct the crown of porcelain both tube and disk should of course be made of platinum, and the soldering and reinforcing should be done with twenty-five per cent platinum solder. The crown may be then completed on this base in the usual manner, and in accordance with the requirements of either style of construction, when it may be mounted with cement. Where the dowel is too short to afford sufficient integrity in the attachment of such a crown, a greater degree of strength may be secured by slightly trephining its projecting end, and extending the tube into the root. No originality, however, is claimed in these suggestions.—Hart J. Goslee, Chicago, *Review.*

PHOSPHOR-NECROSIS.—By Dr. Sarriá, Madrid. (*La Odontologia.*) The object of this paper is to discuss the part which the phosphorus fumes play in the production of the so-called phosphor-necrosis. In view of our present knowledge on the nature of infections phosphorus *per se* has no power to bring about tissue destruction, and the newly admitted theories on the nature of inflammatory processes which require the presence of the septic agent in the seat of the disturbance supports the foregoing assertion. Phosphorus prepares the field for the future invasion of the infecting microorganisms, but is not the direct agent in the production of the so-called phosphor-necrosis, which as a matter of fact is nothing more than an osteitis or carious process brought about by simple infection. The true etiological factor is a general intoxication, an increase in the acidity of the blood-plasma, and the alteration in the structure of the maxillæ caused by an abnormal chemical metabolism. This is the reason why phosphor-necrosis does not develop in workmen whose mouths are in a healthy condition, for in those cases, all avenues of penetration being closed, the infective organism cannot enter the maxillæ and produce the osteitis referred to, while on the contrary the disease sets in as soon as an avenue is laid open either by caries or by a break in the continuity of the mucous membrane. It begins as a diffuse periostitis and ends as a necrosis which may involve not only the mandible but also the neighboring bones. The author concludes by saying that the name of phosphor-necrosis is incorrect and should be abandoned, as the nature of the process is similar to other disturbances of infectious nature, and by recalling the fact that surgical intervention in the treatment of this affection is followed by unsuccessful results.

GENERAL INFECTIONS PRODUCED BY STAPHYLOCOCCUS AUREUS AND BY THE STREPTOCOCCUS.—By Dr. Giuseppe Bellei, Bologna (*Lancet*). This paper is interesting in view of the fact that it supports the opinion that the effects of microbic invasion depend not so much on the virulence of the invaders as on the vital resistance of the invaded organ. Four cases are reported, and

of these the first is a good instance of general invasion and death due to a lack of resisting power rather than to an excessive virulence in the micro-organisms present. This case was that of a physician who infected himself after opening an abscess in the arm of a female servant, and who died two months afterward in consequence of the general infection which ensued in a short time. The servant recovered. Another and also a very interesting feature of the paper is the record of cases of inflammation of the throat and pharynx followed by general infection and death, caused indirectly by chronic inflammation and suppuration of the alveoli. Reference is also made to the suppuration of neighboring lymphatic glands and general infection which follows thoat inflammation in patients suffering from "chronic disease of the gums and maxillary alveoli, attended with the production of pus" (pyorrhea alveolaris). The explanation given for the disastrous effects which follow inflammation of the throat in persons suffering from pyorrhea is that "the saprophytic microorganisms in the mouth become virulent when a chronic inflammation of the alveoli and gums is present, because in the purulent material thereby produced they find a very congenial soil, and they thus acquire a certain virulence. In the next place they enter the tissues at points where a local reaction is not sufficient to hinder their migration into the nearest lymphatic glands or into the blood, where they cause a general infection."

SALIVA A NATURAL PROTECTION AGAINST DENTAL CARIES.—The established opinion that the conversion of starch into sugar and the lubrication of the food bolus are the most important functions of saliva is not shared by Dr. A. Michel (*Deutsche Monatsschrift fur Zahnheilkunde*), who believes that these are only incidental, and that its true function is to protect the teeth by neutralizing, by means of its alkaline constituents, the acids which may be present in the mouth, and also by means of its bactericidal properties to prevent the development of bacteria. He says that notwithstanding that in the carnivora saccharification is unnecessary, saliva is present in their mouths, and further, that in animals which are fed on starchy products the pancreatic secretion suffices very well for the performance of that part of digestion generally attributed to saliva; also that in this variety of animals the quantity of salivary secretion is not in proportion with the work it would have to perform in case it were to take a part in the process of digestion. After taking into consideration the above statements and his many experiments upon this question, Dr. Michel states positively that saliva of normal composition when in sufficient quantity prevents the development of dental caries. He quotes the works of Röse, Eloff Förberg, and Kiehlhauser on the lack of calcium salts in the hard tissues of the teeth of individuals living in regions poor in this kind of compounds, and says that the prevalence of caries in such regions in not due to the lack of calcium salts in the hard tissues of the teeth. but in the saliva, and as a consequence the inability of this fluid to neutralize the acids which may be present upon the teeth. After many tests he has found that the saliva of individuals living in Wurzberg (a region that is rich in calcium salts) contains double the amount of calcium salts found in the

saliva of individuals living in Sohrer (a locality that is poor in calcium salts). As nervous irritation has a great influence upon the composition of saliva, the result follows that nervous persons suffer more from dental caries than perfectly healthy ones. Michel believes that the cyanogen and potassium sulfocyanid found in the saliva are the antibacterial agents. After continuing his research in this direction he has found that in smokers, among whom caries is rare, the amount of cyanogen secreted is increased.

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